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TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION

AT THE

TWENTY-SEVENTH ANNUAL SESSION,

HELD AT NIAGARA FALLS, N. Y.,

COMMENCING ON THE 2D OF AUGUST, 1887.

PUBLICATION COMMITTEE:

GEO. H. CUSHING. A. W. HARLAN. E. T. DARBY.

PHILADELPHIA:
THE S. S. WHITE DENTAL MANUFACTURING CO.
1887.

DISCLAIMER.

The American Dental Association, although formally accepting and publishing the reports of the various Standing Committees and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories, or criticisms therein contained, except when otherwise decided by special resolution.—*Constitution.*

PRESS OF PATTERSON & WHITE,
PHILADELPHIA.

LIST OF OFFICERS FROM DATE OF ORGANIZATION.

PRELIMINARY CONVENTION, NIAGARA FALLS, AUGUST, 1859.

President,	W. W. ALLPORT . . .	Chicago.
Secretary,	J. TAFT	Cincinnati.

ORGANIZATION AND FIRST SESSION OF ASSOCIATION, WASHINGTON, D. C., JULY, 1860.

[Annual meetings to be hereafter last Tuesday in July.]

President,	W. H. ATKINSON . . .	Cleveland.
1st Vice-President,	J. B. GIBBS	Washington, D. C.
2d Vice-President,	W. CAHOON	Detroit, Mich.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	W. MUIR ROGERS . . .	Shelbyville, Ky.
Treasurer,	S. DILLINGHAM . . .	Philadelphia.

[NO MEETING IN 1861.]

CLEVELAND, JULY, 1862.

President,	GEO. WATT	Xenia, Ohio.
1st Vice-President,	W. H. ALLEN . . .	New York City.
2d Vice-President,	W. D. STONE	Lexington, Ky.
Recording Secretary	J. TAFT	Cincinnati.
Corresponding Secretary,	J. F. JOHNSTON . . .	Indianapolis.
Treasurer,	W. A. PEASE	Dayton, Ohio.

PHILADELPHIA, JULY, 1863.

President,	W. H. ALLEN . . .	New York City.
1st Vice-President,	J. H. MCQUILLEN . . .	Philadelphia.
2d Vice-President,	WM. B. HURD . . .	Brooklyn, N. Y.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	C. R. BUTLER	Cleveland.
Treasurer,	A. C. HAWES	New York City.

NIAGARA FALLS, JULY, 1864.

President,	J. H. MCQUILLEN . . .	Philadelphia.
1st Vice-President,	C. P. FITCH	New York City.
2d Vice-President,	H. BENEDICT	Detroit.
Recording Secretary,	J. TAFT	Cincinnati.
Corresponding Secretary,	GEO. W. ELLIS . . .	Philadelphia.
Treasurer,	I. J. WETHERBEE . . .	Boston.

Chicago, July, 1865.

President,	C. W. Spalding	St. Louis.
1st Vice-President,	Geo. H. Cushing	Chicago.
2d Vice-President,	Jas. McManus	Hartford.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	L. D. Shepard	Boston.
Treasurer,	I. J. Wetherbee	Boston.

Boston, July, 1866.

President,	C. P. Fitch	New York City.
1st Vice-President,	W. H. Morgan	Nashville.
2d Vice-President,	L. D. Shepard	Boston.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	A. Hill	Norwalk, Conn.
Treasurer,	W. W. Sheffield	New London, Conn.

Cincinnati, July, 1867.

President,	A. Lawrence	Lowell, Mass.
1st Vice-President,	P. G. C. Hunt	Indianapolis, Ind.
2d Vice-President,	A. S. Talbert	Lexington, Ky.
Recording Secretary,	J. Taft	Cincinnati.
Corresponding Secretary,	C. R. Butler	Cleveland.
Treasurer,	W. H. Goddard	Louisville, Ky.

Niagara Falls, July, 1868.

President,	Jonathan Taft	Cincinnati.
1st Vice-President,	Homer Judd	St. Louis.
2d Vice-President,	A. A. Blount	Springfield, Ohio.
Recording Secretary,	Edgar Park	St. Louis.
Corresponding Secretary,	Jas. McManus	Hartford.
Treasurer,	W. H. Goddard	Louisville.

Saratoga Springs, August, 1869.*

President,	Homer Judd	St. Louis.
1st Vice-President,	S. J. Cobb	Nashville.
2d Vice-President,	C. E. Francis	New York City.
Recording Secretary,	M. S. Dean	Chicago.
Corresponding Secretary,	I. A. Salmon	Boston.
Treasurer,	W. H. Goddard	Louisville.

*Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election; and the sessions of and after 1869 commenced on the first Tuesday in August.

NASHVILLE, AUGUST, 1870.

President,	W. H. MORGAN . . .	Nashville.
1st Vice-President,	S. W. DENNIS . . .	San Francisco.
2d Vice-President,	J. R. WALKER . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD . . .	Louisville.

WHITE SULPHUR SPRINGS, VA., AUGUST, 1871.

President,	GEO. H. CUSHING . . .	Chicago.
1st Vice-President,	C. E. FRANCIS . . .	New York City.
2d Vice-President,	J. R. WALKER . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	I. A. SALMON	Boston.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1872.

President,	P. G. C. HUNT . . .	Indianapolis.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	G. A. MILLS	Brooklyn, N. Y.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD . . .	Louisville.

PUT-IN-BAY, AUGUST, 1873.

President,	T. L. BUCKINGHAM . .	Philadelphia.
1st Vice-President,	ISAIAH FORBES . . .	St. Louis.
2d Vice-President,	A. F. MCLAIN . . .	New Orleans.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	J. TAFT	Cincinnati.
Treasurer,	W. H. GODDARD . . .	Louisville.

DETROIT, AUGUST, 1874.

President,	M. S. DEAN	Chicago.
1st Vice-President,	GEO. W. KEELY . . .	Oxford, Ohio.
2d Vice-President,	J. S. KNAPP	New Orleans.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	GEO. L. FIELD . . .	Detroit.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1875.

President,	A. L. NORTHROP . . .	New York City.
1st Vice-President,	H. J. MCKELLOPS . . .	St. Louis.
2d Vice-President,	H. A. SMITH	Cincinnati.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia.
Treasurer,	W. H. GODDARD . . .	Louisville.

PHILADELPHIA, AUGUST, 1876.

President,	GEO. W. KEELY . . .	Oxford, Ohio.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	CORYDON PALMER . . .	New York City.
Recording Secretary,	C. STODDARD SMITH . .	Springfield, Ill.
Corresponding Secretary,	J. H. MCQUILLEN . . .	Philadelphia.
Treasurer,	W. H. GODDARD . . .	Louisville.

CHICAGO, AUGUST, 1877.

President,	F. H. REHWINKEL . .	Chillicothe, Ohio.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	GEO. T. BARKER . . .	Philadelphia.
Recording Secretary,	M. S. DEAN	Chicago.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1878.

President,	H. J. MCKELLOPS . . .	St. Louis.
1st Vice-President,	L. D. SHEPARD . . .	Boston.
2d Vice-President,	L. D. CARPENTER . . .	Atlanta, Ga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. O. RAWLS	Lexington, Ky.
Treasurer,	W. H. GODDARD . . .	Louisville.

NIAGARA FALLS, AUGUST, 1879.

President,	L. D. SHEPARD . . .	Boston.
1st Vice-President,	C. N. PEIRCE . . .	Philadelphia.
2d Vice-President,	GEO. L. FIELD . . .	Detroit.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	M. H. WEBB	Lancaster, Pa.
Treasurer,	W. H. GODDARD . . .	Louisville.

BOSTON, AUGUST, 1880.

President,	C. N. PEIRCE . . .	Philadelphia.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

NEW YORK, JULY, 1881.

President,	H. A. SMITH	Cincinnati.
1st Vice-President,	W. C. BARRETT . . .	Buffalo.
2d Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. M. DUDLEY . . .	Salem, Mass.
Treasurer,	W. H. GODDARD . . .	Louisville.

CINCINNATI, AUGUST, 1882.

President,	W. H. GODDARD . . .	Louisville.
1st Vice-President,	GEO. J. FRIEDRICHS . .	New Orleans.
2d Vice-President,	E. T. DARBY	Philadelphia.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, AUGUST, 1883.

President,	E. T. DARBY	Philadelphia.
1st Vice-President,	C. S. STOCKTON . . .	Newark, N. J.
2d Vice-President,	T. T. MOORE	Columbia, S. C.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

SARATOGA SPRINGS, AUGUST, 1884.

President,	J. N. CROUSE	Chicago.
1st Vice-President,	M. W. FOSTER . . .	Baltimore.
2d Vice-President,	C. F. RICH	Saratoga.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

MINNEAPOLIS, AUGUST, 1885.

President,	W. C. BARRETT . . .	Buffalo, N. Y.
1st Vice-President,	L. C. INGERSOLL . . .	Keokuk, Iowa.
2d Vice-President,	A. T. SMITH	Minneapolis, Minn.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, 1886.

President,	W. W. ALLPORT . . .	Chicago, Ill.
1st Vice-President,	GEO. W. MCELHANEY . .	Columbus, Ga.
2d Vice-President,	S. W. DENNIS. . . .	San Francisco, Cal.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	A. W. HARLAN . . .	Chicago, Ill.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

NIAGARA FALLS, 1887.

President,	FRANK ABBOTT . . .	New York City.
1st Vice-President,	CHARLES R. BUTLER . .	Cleveland, Ohio.
2d Vice-President,	T. SOLLERS WATERS . .	Baltimore, Md.
Recording Secretary,	GEO. H. CUSHING . . .	Chicago, Ill.
Corresponding Secretary,	FRED. A. LEVY . . .	Orange, N. J.
Treasurer,	GEO. W. KEELY . . .	Oxford, Ohio.

Executive Committee for Session of 1888.

A. W. Harlan, Chairman. S. H. Guilford, Secretary.

First Division—Committee of Arrangements.

A. W. Harlan, W. C. Wardlaw, L. D. Shepard.

Second Division—On Credentials, Ethics, and Auditing Accounts.

A. O. Hunt, *A. M. Dudley, S. G. Perry.

Third Division—On Voluntary Essays.

S. H. Guilford, *E. T. Darby, *A. H. Thompson.

Local Committee of Arrangements.

W. W. Walker, New York City; M. W. Foster, Baltimore, Md.; and T. T. Moore, Columbia, S. C.

* These go out August, 1888.

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Special Notice!

CHANGE OF TIME AND PLACE OF MEETING OF 1888.

AT a conference held at Old Point Comfort between a Committee appointed by the American Dental Association and one appointed by the Southern Dental Association, to agree upon some place for a joint meeting of the two Associations in 1888, it was decided to be best to change the time of meeting to the fourth Tuesday in August instead of the first, and the place to Louisville, Ky., instead of Old Point Comfort, Va.

In accordance with this decision the President of the American Dental Association requested the Secretary to take a vote of the fifteen officers upon the above proposition. The vote was taken, and resulted as follows:

For the change	14
Against the change	1

Consequently, notice is hereby given that the American Dental Association will hold its Twenty-eighth Annual Session at Louisville, Ky., commencing on Tuesday, August 28, 1888.

GEO. H. CUSHING,
Recording Secretary.

CHICAGO, November 21, 1887.

MINUTES OF TRANSACTIONS

OF THE

AMERICAN DENTAL ASSOCIATION.

SESSION OF 1887.

BY GEORGE H. CUSHING, SECRETARY.

FIRST DAY—MORNING SESSION.

THE AMERICAN DENTAL ASSOCIATION commenced its Twenty-seventh Annual Session in the Park Theatre, Niagara Falls, N. Y., on Tuesday, August 2, 1887, at 11 o'clock A. M., the President, W. W. Allport, in the chair.

Prayer was offered by Rev. C. S. Stowitts, of Niagara Falls.

The roll of members was called, and the following were found either to be present or to have forwarded their dues:

ATKINSON, W. H.	41 East Ninth st., New York.
ABBOTT, FRANK	22 West Fortieth st., New York.
*ALLEN, E. H.	Freeport, Ill.
ALLPORT, W. W.	Argyle Building, Chicago, Ill.
*AMES, W. B.	Pullman Building, Chicago, Ill.
BISHOP, J. ADAMS	32 West Thirty-sixth st., New York.
*BÖDECKER, C. F. W.	60 East Fifty-eighth st., New York.
BROWN, S. B.	Fort Wayne, Ind.
BARRETT, W. C.	208 Franklin st., Buffalo, N. Y.
BUTLER, C. R.	519 Euclid ave., Cleveland, O.
*BAIRD, W. H.	Burlington, Iowa.
*BOICE, ALONZO	1612 Vine st., Philadelphia, Pa.
BROPHY, TRUMAN W.	96 State st., Chicago, Ill.
*BALDWIN, A. E.	828 West Adams st., Chicago, Ill.
*BARKER, CHAS. C.	Meriden, Conn.
BROWN, A. E.	1536 Wabash ave., Chicago, Ill.

* Those marked thus were absent, but sent their dues.

d Those marked thus were delegates, but not permanent members.

*Brackett, C. A.	102 Touro st., Newport, R. I.
*Bogue, E. A.	29 East Twentieth st., New York.
*Bullock, C.	569 Main st., Cambridgeport, Mass.
*Brown, Ira	225 Detroit st., Cleveland, Ohio.
*Brockway, A. H.	13 Greene ave., Brooklyn, N. Y.
Barrows, David E.	Olean, N. Y.
Cushing, George H.	96 State st., Chicago, Ill.
Crouse, J. N.	2231 Prairie ave., Chicago, Ill.
*Clifton, W. R.	Waco, Texas.
*Chaim, M. L.	18 Cooper Union, New York.
*Chittenden, C. C.	Madison, Wis.
*Colgrove, W. H.	Johnstown, N. Y.
*Colton, Aaron	Hudson, N. Y.
*Cook, C. D.	133 Pacific st., Brooklyn, N. Y.
Cowie, Henry	Detroit, Mich.
Curtis, G. L.	Syracuse, N. Y.
Cole, John V.	Gowanda, N. Y.
*Clapp, Dwight M.	62 Trinity Terrace, Boston, Mass.
*Dennis, S. W.	530 Sutter st., San Francisco, Cal.
Darby, E. T.	1513 Walnut st., Philadelphia, Pa.
Dudley, A. M.	304 Essex st., Salem, Mass.
*Douglass, B.	Appleton, Wis.
*Doyle, B. Oscar	735 Jefferson st., Louisville, Ky.
*Dickinson, W. P.	Dubuque, Iowa.
*Downs, E. D.	Owego, N. Y.
Douglass, E. G.	Lapeer, Mich.
Dailey, M. H.	Akron, N. Y.
Freeman, S. A.	14 Court st., Buffalo, N. Y.
*Fundenburg, W. H.	959 Penn ave , Pittsburg, Pa.
*Field, George L.	Detroit, Mich.
*Foster, M. W.	9 West Franklin st., Baltimore, Md.
*Freeman, A. W.	Opera House Building, 112 Clark st., Chicago, Ill.
*Fillebrown, Thomas	Portland, Me.
*Fuller, A. H.	2626 Washington ave., St. Louis, Mo.
*Finley, M. F.	1929 Penna. ave., Washington, D. C.
Fundenburg, W. F.	958 Penn ave., Pittsburg, Pa.
Guilford, S. H.	1513 Walnut st., Philadelphia, Pa.
Gaylord, E. S.	New Haven, Conn.
*Gilmer, T. L.	Quincy, Ill.
*Graves, E. L.	559 West Madison st., Chicago, Ill.
*Hawes, E. P.	Providence, R. I.
*Hoysradt, G. W.	Ithaca, N. Y.
*Holmes, E. S.	Grand Rapids, Mich.
Hooper, J.	644 Fourth ave., Louisville, Ky.
Harlan, A. W.	70 Dearborn st., Chicago, Ill.
*Honsinger, E.	318 Park ave., Chicago, Ill.
How, W. Storer	Chestnut st., cor. Twelfth, Philada., Pa.

Hunt, A. O.	Iowa City, Iowa.
Horton, W. P.	177 Euclid ave., Cleveland, O.
*Hill, S. J.	Fargo, Dakota.
*Haywood, T. T.	1229 Hennepin ave., Minneapolis, Minn.
Harroun, C. H.	Toledo, O.
*Horne, R. F.	Watertown, Mass.
*Hacker, T. S.	Indianapolis, Ind.
*Hunt, P. G. C.	Indianapolis, Ind.
*Ingersoll, L. C.	Keokuk, Iowa.
Jackson, V. H.	6 East One-hundredth st., New York.
*Jenison, M. G.	301 Nicollet ave., Minneapolis, Minn.
*Jefferis, C. R.	Wilmington, Del.
*Johnson, C. N.	Opera House, Chicago, Ill.
Keely, George W.	Cor. High and Main sts., Oxford, O.
*Keely, Charles I.	Cor. High and Third sts., Hamilton, O.
Keech, E. P.	127 North Charles st., Baltimore, Md.
*Kingsbury, C. A.	1119 Walnut st., Philadelphia, Pa.
*Keith, H. H.	2248 Washington ave., St. Louis, Mo.
*Knepper, G.	Los Angeles, Cal.
*Knowles, Sam'l E.	S. E. cor. Post and Dupont sts., San Francisco, Cal.
Knapp, J. Rollo	103 Canal st., New Orleans, La.
d Kirk, Sam'l T.	Kokomo, Ind.
Knapp, W. B.	Ft. Wayne, Ind.
Luckey, B. F.	Paterson, N. J.
*Leiter, Thomas C.	Wadsworth, Ohio.
Levy, Fred. A.	Orange, N. J.
*Lewis, C. W.	445 North Clark st., Chicago, Ill.
*Litch, Wilbur F.	1627 Chestnut st., Philadelphia, Pa.
*McElhaney, G. W.	Columbus, Ga.
Morrison, W. N.	1337 Washington ave., St. Louis, Mo.
McManus, James	Hartford, Conn.
McKellops, H. J.	2630 Washington ave., St. Louis, Mo.
*Moore, T. T.	Columbia, S. C.
*Maercklein, B. G.	Iron Block, Milwaukee, Wis.
*Maercklein, Robert	Iron Block, Milwaukee, Wis.
*Marshall, John S.	Argyle Building, Chicago, Ill.
Martin, W. J.	181 West Madison st., Chicago, Ill.
Munn, E. W.	Dubuque, Iowa.
*Melotte, George W.	Ithaca, N. Y.
*Morgan, Henry W.	12 North High st., Nashville, Tenn.
*Morgan, W. H.	12 North High st., Nashville, Tenn.
*Noble, H. B.	600 Thirteenth st., Washington, D. C.
Northrop, A. L.	44 West Forty-sixth st., New York.
*Noyes, Edmund	65 Randolph st., Chicago, Ill.
*Nickson, E. D.	Humboldt, Iowa.
*Odell, F. M.	8 East Forty-second st., New York.

*Osgood, Charles H.	147 Tremont st., Boston, Mass.
Ottofy, Louis	1228 Milwaukee ave., Chicago, Ill.
*Perry, S. G.	46 West Thirty-seventh st., New York.
*Palmer, J. W.	Fitchburg, Mass.
Peirce, C. N.	1415 Walnut st., Philadelphia, Pa.
*Page, W. E.	Room 11, Studio Building, Boston, Mass.
*Patterson, J. D.	800 Main st., Kansas City, Mo.
*Pruyn, Charles P.	70 Dearborn st., Chicago, Ill.
*Patrick, John J. R.	Belleville, Ill.
Peterson, C. J.	Dubuque, Iowa.
Priest, A. N.	Utica, N. Y.
Palmer, Stewart B.	Syracuse, N. Y.
*Palmer, Edgar	La Crosse, Wis.
*Palmer, James G.	112 West Thirty-eighth st., New York.
Proctor, W. C.	Gowanda, N. Y.
*Rhone, J. W.	Bellefonte, Pa.
Rhein, M. L.	104 East Fifty-eighth st., New York.
Reid, J. G.	30 McCormick Block, Chicago, Ill.
Roberts, Norman J.	Waukegan, Ill.
Remington, F. A.	57 West Forty-ninth st., New York.
Rohland, C. B.	Alton, Ill.
*Smith, Eugene H.	283 Dartmouth st., Boston, Mass.
Smith, H. A.	128 Garfield Place, Cincinnati, Ohio.
Shepard, L. D.	100 Boylston st., Boston, Mass.
Stockton, C. S.	Newark, N. J.
*Swain, E. D.	65 Randolph st., Chicago, Ill.
*Smith, A. T.	258 First ave., Minneapolis, Minn.
Stewart, W. C.	Elmira, N. Y.
*Shirley, W. M.	Hiawatha, Kan.
Southwell, C. P.	304 Grand ave., Milwaukee, Wis.
*Starr, A. R.	164 East Ninety-first st., New York.
Straight, Milton B.	485 Main st., Buffalo, N. Y.
Shryock, W. W.	Fort Wayne, Ind.
*Toledo, M. V.	113 East Eighteenth st., New York.
*Thomas, G. R.	Pasadena, Cal.
Taft, J.	122 West Seventh st., Cincinnati, O.
Taylor, James I.	143 West Seventh st., Cincinnati, O.
*White, Samuel A.	Savannah, Ga.
*Wendell, W. C.	Iron Block, Milwaukee, Wis.
*Wilson, I. P.	Burlington, Iowa.
Watkins, S. C. G.	Mont Clair, N. J.
*Wadsworth, T. A.	159 West Thirty-fourth st., New York.
Walker, William Wallace	67 West Ninth st., New York.
*Walton, J. C.	Howell, Mich.
Waters, T. S.	Baltimore, Md.
Whitslar, W. H.	Youngstown, Ohio.
*Whitslar, F. S.	Youngstown, Ohio.

* Weeks, Thomas E. . . .	301 Nicollet ave., Minneapolis, Minn.
Winder, R. B.	140 Park ave., Baltimore, Md.
* Waters, George F. . . .	8 Beacon st., Boston, Mass.
* Wassall, J. W. . . .	208 Dearborn ave., Chicago, Ill.

Any inaccuracies in the above list, in name or location, should be reported to the Treasurer at once, in order that the necessary corrections may be made.

Annual dues being payable in advance, no name appears on above list except of those who have paid for 1887, and Transactions are not sent to any who have not fully paid their dues.

Dues must be paid to the Treasurer. Send draft, P. O. money order, or express order. *Never* send currency by mail.

On motion the reading of the printed minutes was dispensed with.

The minutes *ad interim* were then read as follows, and approved:

MINUTES OF BUSINESS TRANSACTED *AD INTERIM.*

On May 3d the following communication was placed in the hands of the Recording Secretary:

To the Recording Secretary of the American Dental Association.

Dear Sir:—On April 24th, I received from the President of the Association the following letter:

Chicago, April 23, 1887.

A. W. Harlan, M. D.,
Corresponding Secretary American Dental Association.

My Dear Doctor:—For well-known, and what seem to me to be "extraordinary reasons," many members, as well as officers, of the American Dental Association have expressed the wish that the next meeting of the Association be postponed until next year. The reasons given for desiring the change seem to be sufficiently urgent, and the members asking it sufficiently numerous, to demand that some action be taken upon the subject by the officers of the Association, as provided in section two (2) Article four (4) of the Constitution.

I therefore request that you communicate with each officer of the Association and ask him to state whether he will or not consent that the next meeting of the Association be postponed until 1888. Very truly yours,

W. W. Allport, *President.*

In accordance with these instructions I issued the following circular letter:

To the Officers and Members of the Executive Committee of the American Dental Association.

Dr. ——, ————.

Dear Sir:—The following letter, received from the President of the American Dental Association, explains itself:

A. W. Harlan, M.D., D.D.S.,
Corresponding Secretary American Dental Association.

My Dear Doctor:—For well-known, and what seem to me to be "extraordinary reasons," many members, as well as officers, of the American Dental Association have expressed the wish that the next meeting of the Association be post-

poned until next year. The reasons given for desiring the change seem to be sufficiently urgent, and the members asking it sufficiently numerous, to demand that some action be taken upon the subject by the officers of the Association, as provided in section two (2) Article four (4) of the Constitution.

I therefore request that you communicate with each officer of the Association, and ask him to state whether he will or will not consent that the next meeting of the Association be postponed until the first Tuesday in August, 1888, at Asheville, North Carolina. Very truly yours,

W. W. ALLPORT, *President.*

In accordance with the above request this letter is transmitted, and you will please forward at once your vote, for or against the above proposition, to the undersigned. Very respectfully,

A. W. HARLAN,
Corresponding Secretary American Dental Association.

CHICAGO, April 25, 1887.

A. W. HARLAN, *Cor. Sec'y.*

On April 30th the following letter and protest from Dr. W. C. Barrett was received by the Recording Secretary, and by him at once placed in the hands of the President:

EDITORIAL OFFICE, 208 FRANKLIN STREET,
BUFFALO, N. Y., April 30th, 1887.

DR. GEORGE H. CUSHING, *Sec., etc.*

Herewith I send you a protest against the plan of abandoning the meeting of the A. D. A. for this year, which I desire that you will lay before the proper authority. I suggest that in fulfillment of your duty it will be necessary for you to have the protest, etc., printed, and a copy mailed to each of the officers of the A. D. A., and their vote taken on the legal aspect of the case. If the officers fail to call the regular annual meeting, and the event proves that there is no legal warrant for their action, they will doubtless be held to a strict accountability, and it is therefore incumbent upon them to keep within the pale of the law. This they will of course desire to do. I raise the point of order now, because it will certainly come up, and it is better that it come up now than when too late. I sign it with Dr. Abbott's name by his authorization.

Most truly yours,

W. C. BARRETT.

GEORGE H. CUSHING,
Secretary of the American Dental Association.

We, the undersigned, desire to file with you for transmission to the President and officers of the Association our protest against the abandonment of the regular annual meeting of the Association for this year, and to raise the following point or points of order, which we desire should be laid before the board, and which it will be necessary to overrule before such action can be legally taken.

POINT OF ORDER.

That, under the Constitution, the Executive Committee and officers have no power to declare that a meeting shall not be held. Article IV provides as follows:

"The regular meetings of the Association shall be held annually, and commence on the first Tuesday in August. The place of meeting shall be determined each year by vote of the Association."

An amendment to this Article was adopted in 1882 as follows:

"Sec. 2. The officers may for extraordinary reasons change the time and place of meetings upon the written consent of ten (10) of the fifteen (15) officers."

We submit that power to change the time and place of meeting was delegated to the officers for a specific reason, and that it in no sense conveys authority to abandon the meetings altogether. If this were the case the officers would have it in their power to destroy the organization, by refusing to call the regular annual meetings at any time.

In 1881 the time was changed to allow those who desired to attend the meetings of the International Medical Congress in London to be present at both. This was done without any authority, but it stood because of there being no objection raised. At the meeting so convened, the amendment now known as Sec. 2 of Article IV of the Constitution was offered to meet such emergencies, and at the next regular meeting it was adopted. But we submit that this never contemplated the total abandonment of any meeting. The time of the meeting of 1881 was changed to *allow* members to attend both meetings, whereas it is now, we are informed, proposed to intermit the meeting of the Association to *prevent* the attendance upon both.

The neglect and refusal of the officers to call the meeting of the Association could not be excused under section 2 of Article IV, because such action could not be considered a change of time within the meaning of the amendment. According to the Constitution a meeting *must* be held during the year 1887. The officers have no discretion in the matter. The time cannot be changed to 1888, for the meeting so held would not, within the meaning of the Constitution, be that of 1887, and could not be construed as a mere change of the time for holding such meeting. It would necessarily become the meeting of 1888.

The officers may change the time and place for holding any annual meeting, but they cannot legally or without gross neglect of a plainly prescribed duty refuse to call the regular annual meeting *for this year*. They must either allow the time and place fixed by the Association at Niagara last year to stand, or they must change either or both within the plain meaning of the Constitution. They cannot utterly refuse to call the regular annual meeting for the year 1887.

Respectfully submitted.

W. C. Barrett,
Frank Abbott,
Members of the A.D.A.

On May 3d the Recording Secretary received from the Corresponding Secretary a statement of the vote taken on postponement, which resulted as follows:

For postponement	12
Against postponement	3

On May 7th the Recording Secretary received from the President the following communication, copies of which were immediately forwarded to the dental journals:

Chicago, Ill., May 6, 1887.

Dr. Geo. H. Cushing,
Recording Secretary American Dental Association.

Dear Sir:—Your letter of April 30th, accompanied with a copy of a communication from Drs. W. C. Barrett and Frank Abbott, making a protest against a proposed action of the officers of the Association looking to the postponement of the regular annual meeting of the American Dental Association of the present

year until 1888, and raising what they term a "point of order" as to the power of the officers under the Constitution to do so; also your letter of more recent date with a statement of the vote upon the question submitted to the officers of the Association, is received.

As the question raised had not occurred to me before, and the existing circumstances are of more than ordinary importance, I have thought it best to take such time to consider the subject as would enable me to reach a correct conclusion as to the power of the officers to change the time and place of the Association's annual meeting: hence the delay in my reply.

It should be noticed that the gentlemen do not question the power of the officers to change the time and place of meeting, provided the time is fixed within the year 1887.

The authority that the officers have (if such authority exists) to postpone the next annual meeting to 1888, is found in section two (2) of Article four (4) of the Constitution. So much of the Article as in any way governs the question, and to which reference is made by the protestants, reads as follows:

"TIME OF MEETINGS. The regular meetings of the Association shall be held annually, and commence on the first Tuesday in August. The place of meeting shall be determined each year by vote of the Association.

"Sec. 2. The officers may, for extraordinary reasons, change the time and place of meeting upon the written consent of ten (10) of the fifteen (15) officers."

As Drs. Barrett and Abbott are not officers of the Association, and have no right to vote upon the question at issue, or upon an appeal from any decision made, I could not see clearly how they could raise a point of order. The question, it seems to me (for the time being at least), was a matter that rested entirely with the officers of the Association.

The point they raise is valuable, however, as it has suggested a more thoughtful consideration of the question as to whether the officers have the power to omit a regular annual meeting of the Association, for if the regular meeting for this year is postponed until 1888, the meeting of 1887 or that of 1888 would, of necessity, have to be omitted.

Upon a careful reading of the Article referred to, I became satisfied that an honest construction of its meaning forbade the officers postponing the meeting until next year. But before giving this as my decision, I felt that I should take counsel with some one in whose opinion the Association could rest with assured confidence.

With this idea in view, I placed the Constitution of the Association and the protest of Drs. Barrett and Abbott in the hands of ex-United States Senator Lyman Trumbull, and asked him to give me his written opinion upon the entire subject, which will be found in the following copy of a letter received from him:

CHICAGO, May 4, 1887.

DR W. W. ALLPORT,

President American Dental Association, Argyle Building, City.

DEAR SIR:—The authority of the officers of the American Dental Association to dispense with the annual meeting is one of power under the Constitution, and not a question of order as to the course of proceeding, which could only be raised by a member of the Association in one of its meetings.

In my opinion a fair construction of Article IV of the Association's Constitution requires regular meetings of the Association to be held annually. While section

2 of that Article authorizes the officers, for extraordinary reasons, to change the time and place of meeting upon the written consent of ten of the fifteen officers, I do not think it contemplated a repeal of the first section, which requires annual meetings to be held, but was intended rather to authorize a change of the time and place of holding the annual meeting. My conclusion is that the officers would not be authorized under the Constitution to dispense altogether with the annual meeting. Yours truly,

LYMAN TRUMBULL.

With the opinion of a gentleman of such large experience in, and accurate knowledge of, parliamentary proceedings, and acknowledged standing as an able constitutional lawyer, I must accept his interpretation, and decide that the officers of the Association have no power to omit an annual meeting, and therefore direct that the vote just taken be not recorded.

Very truly yours,

W. W. ALLPORT, *President.*

On the 26th of May the Recording Secretary received the following:

TO THE RECORDING SECRETARY OF THE AMERICAN DENTAL ASSOCIATION.

DEAR SIR:—I this day received instructions from the President of the Association to take a vote of the officers of the Association upon the following propositions:—1st. To change the time of meeting from Tuesday, August 2d, to Wednesday, August 24th. 2d. To change the place of meeting from Asheville, N. C., to either Asbury Park, N. J., or Niagara Falls. In accordance with these instructions I issued the following letter:

A. W. HARLAN, *Corresponding Secretary.*

CHICAGO, May 26, 1887.

TO THE OFFICERS OF THE AMERICAN DENTAL ASSOCIATION.

Dr.———, ———.

DEAR SIR:—I have been directed by the President of the Association to take a vote of the officers on the two following propositions:

1st. To change the time of meeting from Tuesday, August 2d, to Wednesday, August 24th.

2d. To change the place of meeting from Asheville, N. C., to either Asbury Park, N. J., or Niagara Falls.

You are requested to state whether you will consent to the change in time, and also at which of the places mentioned you prefer the meeting to be held.

An early reply will be necessary in order to make announcement in the journals. Yours respectfully,

A. W. HARLAN, *Corresponding Secretary.*

On June 10th the Recording Secretary received from the Corresponding Secretary a statement of the vote on the above proposition as follows:

On Change of Time of Meeting.

For change	3
Against change	11
Not voting	1

On Change of Place of Meeting.

For Niagara Falls	10
For Asbury Park	4
Not voting	1

On June 11th the following communication from the President of the Association was placed in the hands of the Recording Secretary:

CHICAGO, June 11, 1887.

DR. GEO. H. CUSHING,
Recording Secretary American Dental Association.

DEAR SIR:—Ten of the fifteen officers of the Association having consented to change the place of meeting from Asheville, North Carolina, to Niagara Falls, at the regular time of meeting, August 2d, you are hereby directed to announce the same officially in the journals.

Yours respectfully,

W. W. ALLPORT,
President American Dental Association.

In accordance with these instructions notices of the time and place of meeting were immediately forwarded to the various dental journals in the country.

The President subsequently appointed as the Local Committee of Arrangements, Drs. S. A. Freeman, of Buffalo, J. W. Wassall, of Chicago, and E. C. Moore, of Detroit.

GEO. H. CUSHING,
Recording Secretary.

The Executive Committee reported a programme, which was accepted.

The Committee on Credentials made a partial report, which was accepted as a report of progress, and was subsequently completed, as follows:

Chicago Dental Society—T. W. Brophy, J. N. Crouse, Geo. H. Cushing, A. W. Harlan.

Eighth District Dental Society of the State of New York—John V. Cole, David E. Barrows, Whitney C. Proctor, Merritt H. Dailey.

Iowa University, Dental Department—A. O. Hunt.

Indiana State Dental Association—S. B. Brown, W. W. Shryock, S. T. Kirk, W. B. Knapp.

Illinois State Dental Society—Louis Ottofy, C. B. Rohland.

Iowa State Dental Society—C. J. Peterson, E. W. Munn.

Michigan Dental Association—E. G. Douglass.

Missouri State Dental Association—W. N. Morrison.

New York First District Dental Society—A. L. Northrop, W. H. Atkinson, W. W. Walker.
New Jersey State Dental Society—B. F. Luckey, S. C. G. Watkins.
Ohio College of Dental Surgery—J. I. Taylor.
Pennsylvania College of Dental Surgery—C. N. Peirce.
Pennsylvania State Dental Society—S. H. Guilford.

The Publication Committee then read their report, as follows:

NIAGARA FALLS, August 2, 1887.

The Publication Committee would report that the Transactions were published by The S. S. White Dental Manufacturing Co., under the same arrangement as heretofore, and that through Mr. Hise's careful assistance the Committee was able to present the matter in the same excellent style as formerly.

The usual number of copies were printed, and most of them were bound in cloth. About seventy remain on hand.

As previously, the distribution was made to active members whose dues were paid, and to the libraries, universities, journals, and honorary members entitled to receive them. They were mailed December 31,—not quite as early as last year,—but earlier than has generally been possible.

RECEIPTS AND EXPENDITURES.

Received from Treasurer	$97.00	
" " sale of Transactions	6.00	
		$103.00
Expended for expressage, paper, and copying	$13.50	
" " S. S. White Dental Manufacturing Co.'s bill for cloth binding and mailing	62.31	
" " printing	7.00	
" " stationery, engraving, postage, and incidentals (voucher 2 included)	28.25	
		$111.06
Balance due the Committee		$8.06

All of which is respectfully submitted.

GEO. H. CUSHING, *Chairman.*

Audited and found correct, August 2, 1887. Amount balance due Publication Committee, $8.06.

A. O. HUNT, LOUIS OTTOFY, *Auditing Committee.*

The amendments to the Constitution proposed last year by the Executive Committee were then considered.

That to amend Article IV by "striking out all after the second sentence" was indefinitely postponed.

That to amend Article V, section 6, by inserting the following at the end of

the first sentence, "through its secretary, whose sole duty it shall be to keep a correct record of its proceedings," and by striking out the word "they" in the second sentence and substituting for it the word "it," containing two propositions, was on motion divided.

The first proposition was indefinitely postponed.

The second, to substitute "it" for "they" in the second sentence in Article V, section 6, was adopted.

That to amend same section,—head Sub-Committees,—by interpolating after the words "three members of this committee shall," the words "under the direction of its chairman," and "to strike out the last sentence in same paragraph" was indefinitely postponed.

That to amend same section (Article V, section 6), last paragraph under heading, "Chairman may convene the Committee," add the following words, "and at any other time at the request of two members of the committee," was amended to read "five members" instead of two, and was then adopted.

The President then read his address, which was referred to the Publication Committee.

The Sections then announced the places at which they would meet immediately after adjournment.

Adjourned to meet at 8 P. M.

FIRST DAY—EVENING SESSION.

The Association was called to order at 8.15 P. M., the President in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business, the Treasurer was instructed to pay all properly authenticated bills.

Section II was then called, and Dr. Ottofy, secretary of the Section read the report. Dr. Atkinson, chairman of the Section, read a paper on Nomenclature, and Dr. Crouse, also of the Section, read one on Education. The subjects were discussed by Drs. Atkinson, Abbott, Winder, Guilford, Crouse, and Taft.

The Committee on Credentials then made a supplemental report, which was accepted as a report of progress.

The Treasurer submitted his report, as follows:

NIAGARA FALLS, N. Y., August 2, 1887.

THE AMERICAN DENTAL ASSOCIATION IN ACCOUNT WITH GEO. W. KEELY, TREASURER.

		Cr.
By balance Aug. 4, 1886		$2,618.45
Dues received		1,160.00
Rent, per Dr. S. A. Freeman		15.00
		$3,793.45

DISBURSEMENTS.

	Dr.	
The S. S. White Dental Manufacturing Co	$97.00	
A. O. Hunt, stationery	.95	
G. H. Cushing, salary	200.00	
G. H. Cushing, reporter's salary	125.00	
S. G. Perry, postage and telegrams	4.45	
W. C. Barrett, gavel and express	4.25	
G. W. Keely, salary	100.00	
G. W. Keely, postage and express	6.75	
Door-keeper	10.00	
S. A. Freeman, expenses	8.65	
S. A. Freeman, balance on rent	80.00	
Frank Abbott, investigation, Section V	105.76	
Louis Ottofy, investigation, Section VII	50.00	
Four books, receipts and delinquent notices	21.00	
W. D. Miller, expense for investigation	100.00	
Louis Ottofy, electrotyping and printing	50.00	
		$963.81
Balance on hand		$2,829.64

Audited and approved, Aug. 3, 1887.

A. O. HUNT,
LOUIS OTTOFY,
Auditing Committee.

Adjourned to meet at 9 A. M. to-morrow.

SECOND DAY—MORNING SESSION.

The Association met at 9 A. M., the President in the chair.

The minutes of last evening's session were read and approved.

Under the head of miscellaneous business, by unanimous consent, on motion of Dr. Shepard, the selection of the place of next meet-

ing and the election of officers were made the special order of business for 9 o'clock A. M. Thursday.

Discussion of subjects in Section II was resumed and participated in by Drs. Butler, Peirce, Darby, Barrett, W. B. Knapp, and Atkinson.

On motion, the subjects were passed.

Section III was called, and its report was read by the chairman, Dr. E. T. Darby.

Dr. Morrison then presented his method of regulating teeth, and a case of regulating was presented by Dr. Watkins, another by Dr. Geo. W. Keely, and two cases in practice by Dr. Barrett.

The subjects were discussed by Drs. Priest, Crouse, Harroun, Land, A. E. Brown, Morrison, H. A. Smith, Abbott, and W. B. Knapp.

On motion, the Section was passed.

Section IV being called, a brief report, and a paper on the Comparative Anatomy of the Teeth, were read by the Chairman, Dr. Abbott.

Discussed by Drs. Barrett, Abbott, Atkinson, and Peirce.

On motion, the subject was passed.

The Sections then organized, as follows:

SECTION I. Prosthetic Dentistry, Metallurgy, and Chemistry.—J. Rollo Knapp, chairman; W. B. Ames, secretary; C. H. Harroun, M. B. Straight, A. N. Priest, Henry Cowie, T. S. Waters, S. A. Freeman, W. A. Spaulding, Alonzo Boice, A. W. Freeman, Geo. W. Melotte, Thomas C. Leiter, C. B. Rohland, M. L. Chaim, H. B. Noble, J. F. Austin, J. T. Abbott, John Allen, J. H. Baldwin, A. E. Baldwin, A. R. Begun, C. M. Bailey, G. V. I. Brown, J. R. Bell, Jas. Cleland, C. C. Chittenden, E. B. Call, W. H. Crary, Aaron Colton, F. W. Clawson, E. E. Cady, W. C. Dyer, B. Douglass, W. H. Dorrance, W. H. Fundenberg, M. W. Foster, E. M. S. Fernandez, Wm. V. Grove, E. S. Holmes, E. E. Hughes, L. P. Haskell, C. B. Hewitt, A. O. Howe, R. F. Horne, H. H. Keith, W. O. Kulp, J. S. Kulp, C. A. Kitchen, Jas. Lathrop, Edgar Palmer, W. C. Proctor, E. S. Talbot, J. I. Taylor, D. E. Barrows.

SECTION II. Dental Education, Literature, and Nomenclature.—W. H. Atkinson, chairman; Louis Ottofy, secretary; S. H. Guilford, S. B. Brown, J. Taft, W. B. Knapp, J. N. Crouse, W. P. Horton, C. N. Peirce, T. S. Waters, C. H.

Osgood, J. W. Wassall, R. B. Winder, W. C. Wardlaw, C. B. Rohland, L. C. Ingersoll, L. P. Bethel, W. H. Morgan, A. O. Hunt, J. B. Newby, A. T. Bigelow, E. D. Brower, E. L. Brooks, E. A. Bogue, C. D. Cook, Henry Cowie, S. W. Dennis, Chas. E. Dunn, Wm. Dutch, E. G. Douglass, A. F. Emminger, Geo. L. Field, G. W. Fuller, L. K. Fullerton, W. B. Finney, T. S. Hacker, W. Carlos Hayes, Walter H. Hertz, E. P. Keech, C. A. Kingsbury, Henry A. Knight, S. H. King, G. Knepper, D. E. Kelly, L. W. Lyon, F. H. Rehwinkel, R. G. Richter, F. R. Ross, Martin Viet, Robert Van Valzah, J. B. Vosberg, I. N. Van De Water.

Section III. Operative Dentistry.—E. T. Darby, chairman; James McManus, secretary; L. D. Shepard, W. N. Morrison, C. P. Southwell, C. H. Harroun, M. B. Straight, A. E. Brown, C. R. Butler, Geo. W. Keely, B. L. Rhein, C. I. Keely, W. F. Fundenberg, W. A. Spaulding, C. S. Stockton, G. W. Hoysradt, Alonzo Boice, E. P. Hawes, Eugene H. Smith, A. H. Brockway, W. W. Shryock, A. H. Fuller, E. C. Wadsworth, V. H. Jackson, B. F. Luckey, Dwight M. Clapp, E. W. Munn, W. E. Page, T. T. Hayward, John V. Cole, S. G. Stevens, E. S. Gaylord, Jas. G. Palmer, T. E. Weeks, W. C. Starbuck, S. B. Palmer, S. C. G. Watkins, W. P. Dickinson, C. P. Pruyn, H. J. McKellops, Marvin E. Smith, C. N. Johnson, E. D. Swain, B. Oscar Doyle, H. L. Moore, E. C. Moore, J. A. Watling, E. Honsinger, Thomas Fillebrown, Wm. J. Martin, R. F. Ludwig, Henry Barnes, A. J. Prosser, S. J. Hill, H. B. Noble, C. W. Lewis, F. S. Whitslar, M. L. S. Buckner, Chas. C. Barker, M. H. Dailey, P. G. C. Hunt, J. B. Newby, E. H. Allen, J. Adams Bishop, C. F. W. Bödecker, E. Parmly Brown, C. Bullock, W. R. Clifton, Wm. Carr, G. C. Daboll, J. Rollo Knapp, E. P. Keech, Geo. W. McElhaney, H. W. Morgan, E. Noyes, S. G. Perry, Robert Van Valzah, G. Knepper, D. E. Barrows.

Section IV. Histology and Microscopy.—Frank Abbott, chairman; Thos. L. Gilmer, secretary; W. B. Knapp, Geo. H. McCausey, E. D. Swain, I. P. Wilson, C. F. W. Bödecker, Ira Brown, Chas. S. Butler, L. Balcom, D. E. Barrows, L. C. Davenport, E. B. Dillingham, L. L. Davis, M. F. Finley, H. H. Jackson, Thos. T. Moore, B. G. Maercklein, Robert Maercklein, J. S. Marshall, A. Morsman, J. B. Monfort, G. W. Miller, J. H. Martindale, S. J. Moore, D. J. McMillen, H. H. Reed.

Section V. Materia Medica and Therapeutics.—A. W. Harlan, chairman; W. H. Whitslar, secretary; J. Hooper, W. C. Stewart, W. W. Walker, J. G. Reid, W. W. Allport, A. L. Northrop, Geo. F. Waters, C. R. Jefferis, S. C. G. Watkins, E. L. Guffin, E. D. Swain, E. D. Downs, J. W. Palmer, J. W. Rhone, A. Doud, A. M. Dudley, C. S. Beck, Frank H. Gardiner, P. J. Kester, Jas. Lathrop, Geo. W. McElhaney, E. D. Nickson, N. Nelson, F. M. Odell, W. W. Ormsbee, S. G. Perry, J. A. Swasey, W. H. Baird.

Section VI. Physiology and Etiology.—H. A. Smith, chairman; A. H. Thompson, secretary; T. W. Brophy, W. C. Barrett, Louis Ottofy, W. P. Horton, J. N. Farrar, W. M. Shirley, F. A. Williamson, J. W. Wassall, J. Adams Bishop, W. H. Baird, Joseph Bauer, Wm. Carr, C. S. Case, C. W. Clement, W. H. Colgrove, Geo. J. Friedrichs, E. L. Graves, S. E. Knowles, C. Edmund Kells, Jr., W. F. Litch, Fred. A. Levy, W. F. Lewis, F.

A. Remington, A. T. Smith, W. B. Smith, C. C. Southwell, H. J. Smith, J. H. Smith, Geo. D. Sitherwood, A. R. Starr, M. V. Toledo, Geo. R. Thomas, C. A. Timme, C. J. Tibbetts, J. D. Patterson.

SECTION VII. Anatomy, Pathology, and Surgery.—T. W. Brophy, chairman; M. L. Rhein, secretary; W. C. Barrett, J. Hooper, W. H. Atkinson, N. J. Roberts, W. Storer How, J. W. Wassall, M. G. Jenison, G. L. Curtis, Jas. M. Welch, C. A. Brackett, J. D. Patterson, J. J. R. Patrick, C. J. Peterson, Sam'l A. White, W. C. Wendell, T. A. Wadsworth, J. C. Walton, L. C. Wasson, T. B. Wheeler, J. B. Williams, J. G. W. Werner, Wm. Carr.

Adjourned to meet at 8 P. M.

SECOND DAY—EVENING SESSION.

The Association met at 8.15 P. M., the President in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business the Executive Committee reported that they had audited the report of the Publication Committee and that of the Treasurer, and found them correct.

The report was adopted.

Dr. Harlan, Corresponding Secretary, read a letter from the Corresponding Secretary of the Virginia State Dental Association and Chairman of the Executive Committee of the Southern Dental Association, inviting members of the American Dental Association to their next meeting, to be held at Old Point Comfort this year.

Section V was then called and Dr. Harlan, the chairman, read a paper on Materia Medica and Therapeutics. It was discussed by Drs. Barrett, Rhein, Ottofy, Atkinson, Peirce, Watkins, McKellops, Southwell, and Harlan.

On motion the subject was passed.

Section VI being called, the chairman, Dr. H. A. Smith, stated that two papers were to be read from this Section, one by Dr. Ottofy on "Etiology of Decay," and one by Dr. Peirce on "The Origin and Development of the Teeth."

Miscellaneous business was then called, and Dr. Smith, of the Section on Physiology and Etiology, offered the following, which was unanimously adopted:

It is doubtless within the memory of most of the members of this body that at the annual meeting held in Cincinnati, in 1882, the President, in his address, recommended that a prize of $200.00 be offered by the Association, to be awarded for the best original essay upon the Etiology of Dental Caries. The recommendation was adopted, and the sum set apart for this purpose. Such papers were considered in the report of this Section, but their recommendation and the report thereon, as to their fitness for the awarding of the prize was left to a special committee. It was explicitly stated that this prize was not to be limited to members of this Association, but that it was open to the world. It will be remembered that this action was previous to the publication of the many papers upon this subject which have been presented, many of which papers, in the opinion of members of this Section, owe their origin to the stimulation which this offer gave.

At the meeting of this body at Niagara, in 1883, a paper was presented from Dr. W. D. Miller, of Berlin, Germany, which was referred to a special committee, duly considered by them, and to it they unanimously awarded the prize. Their action was considered by this body in full session and, by a practically unanimous vote, was approved. At the close of the meeting, when nearly all the members had departed for their homes, this action was reconsidered, and the award withdrawn.

We believe this action was taken without due consideration, and that it has placed the Association in a false position. The prize had been awarded for a paper which should fulfill certain conditions. The committee of its own appointment, to which the Association had referred the matter, reported that the author of the paper presented had complied with the conditions, and this of itself, we believe, bound the Association to pay the money, as it had agreed. But to make the matter yet stronger, the Association ratified this action by a formal vote, and thus bound itself in honor to pay the money as agreed.

The subsequent action, we think, seriously compromised the honor of the Association, and as the matter originated with this Section, it has since rested heavily upon our consciences, as an injustice not alone to the author of the paper, but as a greater injustice to itself. We believe the Association is in duty bound to yet fulfill its agreement and relieve itself from a charge of dishonorable conduct, which unwittingly and unintentionally it has subjected itself to. This Section, therefore, desires to submit the following :

Resolved, That the Treasurer be instructed to transmit to Dr. W. D. Miller, the author of the paper in question, the sum of $200.00, set apart as a prize for the best paper upon the subject of Etiology of Dental Caries, and that the receipt of Dr. Miller shall be a sufficient voucher for the expenditure.

Dr. Crouse moved a reconsideration of the vote changing the time for the selection of place of next meeting and the election of officers.

The motion was lost.

The resignation of C. H. Land as a member of this Association was tendered and, on motion, was accepted.

Dr. Morrison offered the following resolution, the consideration of which was postponed till to-morrow:

Resolved, That a prize of five hundred dollars ($500) be offered by this Association for a dental cement which shall most nearly approximate gold in resisting the action of the secretions of the mouth and most nearly approach the color and non-conductive properties of the natural teeth.

That it be offered for five years and open to all competitors in every country.

On motion, adjourned until 9 A. M. to-morrow.

THIRD DAY—MORNING SESSION.

The Association met at 9.20 A.M., the President in the chair.

The minutes of last evening's session were read and approved.

On motion the following was unanimously adopted:

Resolved, That the thanks of this Association are tendered the hotels and railroads for courtesies extended, and especially to Dr. S. A. Freeman, chairman of the Local Committee of Arrangements, for his energy and efficiency in attending to the wants of the Association and its members during this meeting.

The resolution of Dr. Morrison offering a prize was referred to the following committee, who are to report next year: A. O. Hunt, Geo. H. Cushing, and A. L. Northrop.

The special order—the selection of place of next meeting and the election of officers—was now called.

The following places were nominated: Saratoga, Asheville, Mackinac, White Mountains, Old Point Comfort, White Sulphur Springs, Cleveland, Lake George, Toledo, Chicago, Alexandria Bay, Louisville.

Old Point Comfort was selected.

The election of officers was then proceeded with, resulting as follows:

President—Frank Abbott, New York, N. Y.
First Vice-President—C. R. Butler, Cleveland, Ohio.
Second Vice-President—T. S. Waters, Baltimore, Md.
Recording Secretary—Geo. H. Cushing, Chicago, Ill.
Corresponding Secretary—F. A. Levy, Orange, N. J.
Treasurer—Geo. W. Keely, Oxford, Ohio.
Executive Committee for Three Years—A. W. Harlan, Chicago; A. O. Hunt, of Iowa City, Iowa, and L. D. Shepard, of Boston, Mass.

Dr. Barrett offered the following:

Resolved, That the American Dental Association, recognizing the desirability of more intimate relations between the leading and representative professional organizations of America, most heartily invites the Southern Dental Association to hold a union meeting with this Association next year. In furtherance of this end the American Dental Association has fixed upon a point for its next meeting which it believes will be convenient for both, and it desires that the officers of both associations shall agree upon a time that will be mutually satisfactory, and hopes that such arrangements as may be made will result in the largest and most profitable meeting of American dentists ever held.

It was unanimously adopted.

On motion the officers of this Association were appointed a committee to confer with the officers of the Southern Dental Association with reference to carrying out the suggestions of Dr. Barrett's resolution as above.

Section VI was then called, and Dr. Peirce read a paper entitled "The Deciduous Teeth: Their Eruption and Removal."

It was discussed by Drs. A. O. Hunt, Brophy, Abbott, Horton, How, Darby, W. B. Knapp, Atkinson, C. P. Southwell, Guilford, and Peirce.

On motion, the subject was passed.

Adjourned till 8 P.M.

THIRD DAY—EVENING SESSION.

The Association met at 8.20 P.M., the President in the chair.

The minutes of the morning session were read and approved.

Under the head of miscellaneous business, the Credentials Committee made their final report, which was adopted.

Dr. Shepard offered the following:

Resolved, That the sum of five hundred dollars be appropriated and set apart in the treasury as a special fund to be under the control of the Executive Committee for the protection of dentists from the unlawful demands of patentees.

Dr. Crouse moved to amend by making the amount one thousand dollars.

The amendment prevailed, and the original motion as amended was then carried by the constitutional majority.

The Secretary then read a communication from the Minneapolis Dental Society, asking for the donation of a set of the Transactions of this Association.

After some discussion the matter was referred to the Publication Committee, with discretionary power.

Section VII being now called, the chairman, Dr. Brophy, read a brief paper on the subject of "Implantation."

A paper on "Sponge-Grafting," by Dr. Atkinson, was read by Dr. Rhein.

The subjects were discussed by Drs. Barrett, Rhein, Morrison, and Harroun.

On motion, the subject was passed.

Section I was called. Dr. Harroun, the chairman, presented a brief report, which was read by Dr. Shepard. Discussed by Drs. C. P. Southwell, A. O. Hunt, and Horton.

On motion, the subject was passed.

On motion, it was voted that the Section appropriations be the same as last year.

Dr. Crouse moved to amend by placing the matter in the hands and at the discretion of the Executive Committee. The amendment was lost.

The following was adopted:

Resolved, That Section II be directed to report at the next meeting of this Association a plan or scheme for the introduction of a course of elementary instruction in dental histology, anatomy, and hygiene into the public schools, in accordance with the suggestion to that effect in the report of the Section.

The minutes were here read and approved.

The newly-elected officers were then installed.

The President appointed Drs. Shepard and Crouse to conduct the President-elect to the chair.

Upon taking the chair the new President made a few appropriate remarks, thanking the Association for the honor it had conferred.

On motion, the following was adopted:

Resolved, That the thanks of this Association are due the retiring President for the dignity, ability, and impartiality with which he has performed the duties of his office.

A special vote of thanks was tendered to Dr. S. A. Freeman, chairman of the Local Committee of Arrangements, for his untiring labors in behalf of the Association and the individual members.

The President appointed on the Publication Committee Drs. Darby and Harlan, and on the Local Committee of Arrangements Drs. W. W. Walker, of New York; M. W. Foster, of Baltimore, and T. T. Moore of Columbia, S. C.

The minutes were then read and approved, and the Association adjourned to meet at Old Point Comfort, the first Tuesday in August, 1888.

GEO. H. CUSHING, *Recording Secretary.*

Annual Address.

By W. W. ALLPORT, President.

Gentlemen of the American Dental Association:

At the time appointed by our constitution we are assembled in our twenty-seventh annual meeting, and it should be a matter of congratulation and thankfulness that during the past year death has not been permitted to remove from us any of our "older, more prominent, or most useful" members.

I have selected for the theme of my address on this occasion the history, power, and usefulness of associated effort in scientific work, in reference to the advancement of the art and science of dentistry.

Associations for the development of particular ideas or interests are by no means new, but associations for the advancement of the various departments of science may be said to be of modern origin. The Greeks met to discuss the ethical and political questions of their day. Their discussions, however, were of a more or less desultory character, lacking in organized effort, and depending rather for their inspiration upon the genius and effort of men singly, than upon a preconcerted or associated effort on the part of the many to advance the knowledge of any particular subject.

That public discussions in those times seldom, or never, extended into the domain of physical science is not to be wondered at, for science, as now understood,—the sifted and classical results of study and experiment,—was then hardly known; and to imagine that there could have been any extended public discussion of scientific topics before a systematic method of study had been adopted would be absurd.

Meetings and associations for the development and furtherance of objects other than scientific reach back to a very early date, and it is a matter of interest to note that with the advancement of thought, as well as of morals, these associations contributed much to the progress of society, if they were not the actual leaders of

public opinion. It is to be noticed, also, that the purposes for which they were formed, as well as the power to which they attained, indicate the character no less than the stage of development of the age in which they existed.

The first associations of any note organized for the purpose of the advancement of science were the Royal Society of England, formed in 1645, and the French Academy of Science, formed in 1666. Soon after these, in the same century, similar associations were organized in other countries of Europe. These associations, organized under royal patronage, were at first hampered by the wishes of their royal patrons as to the subjects discussed, as well as to their membership. As royalty is not always prolific of scientific knowledge, it may be questioned whether its *ipse dixit* did not tend to retard, rather than to advance, the scientific knowledge of those days, for science or knowledge of any kind, like good government, thrives best under freedom of thought and action.

Topics of a medical nature were frequently discussed in the Royal Society of England, in turn with all other scientific subjects, for the society numbered among its members some of the most distinguished medical and surgical practitioners of Great Britain. It was before this society that Harvey demonstrated the circulation of the blood, and Hunter the possibility of ingrafting a tooth into the comb of the cock, and in its reports were published the Hunterian operation for aneurism.

In France, during the latter part of the last century, there was founded a Congress of Surgeons, before which were received and discussed papers upon surgical questions, but these seldom extended far into the domain of medicine.

Germany has long had its association, known as the German Society of Naturalists, in which there is a section on medicine, but so far as I am aware, there is no distinctive *national* medical association in that country.

During the early part of the present century there were formed several small local medical societies in different parts of Europe and in the United States. In our country these societies were for a time confined to what are known as the Eastern states, but as our numbers increased and our population spread, these societies grew in number and they are now organized in every state, and hardly a county or city of any considerable size is to be found which has not its medical society.

So potent were these local *societies* as a means of advancing

medical knowledge and improving the practice and good fellowship among their members, that national associations were soon formed, noticeable among which were the British Medical Association, in 1832, and the American Medical Association, in 1848. Still later, in 1860, there was organized the International Medical Congress, the ninth meeting of which will be held in this country September 5, 1887, its membership including all practitioners in regular medicine and surgery throughout the world, with sections for the presentation of such newly-discovered facts, as well as the consideration of such theories, as will tend to increase the general knowledge and enlarge the scope and usefulness of every department of the curative art, including, of course, a section in dental and oral surgery.

In the United States in 1839 was organized the American Society of Dental Surgeons, which was the first national dental society ever organized. It is interesting to note that this was the first national association in this country which had for its object the furtherance of any department of medical and surgical science, this being nine years prior to the organization of the American Medical Association.

At that time (1839) the science of dental surgery was in a chaotic state, and but little understood by the mass of its practitioners; its literature was of small value, and its practitioners, with few exceptions, were uneducated men, without a knowledge of the simplest principles of medicine; nor could they be ranked even as good mechanics. They were largely adventurers, who by hook or by crook sought to make a living by practicing upon the credulity of those who employed them, caring but little whether they gave an equivalent for what they acquired or not. Their chief concern was to fill their pockets as quickly as possible, and then with prudent haste place an inconvenient distance between themselves and their patients, that they might, in other towns, pursue their vocation unmolested.

To this class, however, there were notable exceptions, although they were few in number. There were gentlemen engaged in the practice of dentistry who had a due appreciation of the organs upon which they operated, and such a sense of professional responsibility that their patients' best interests were the first promptings of their every act. They assumed and believed that dental surgery, when properly practiced, should rank as one of the most useful and respectable departments of medicine. Still they were impressed with

the idea that the practice as then pursued, even at its best, was but in its infancy and needed greatly to be improved. While these gentlemen had faith in the usefulness of their calling and were conscious of their own rectitude and nobleness of purpose, they felt most keenly the reproach that almost of necessity attached to them personally, by virtue of their belonging to a vocation without a standard of generally acknowledged usefulness, and which was pursued mainly by a class of men of whom a large majority were considered as but little if any better than itinerant tinkers.

A determination was formed by the better class of practitioners, that this condition of things should be changed, and well-directed efforts were put forth for its accomplishment. The first combined attempt, of a more than local influence, which had this end in view, was the formation of the American Society of Dental Surgeons, just mentioned.

The object of this society was to stimulate and encourage investigation, to freely contribute any knowledge gained either by study or experience to the society, for the purpose of increasing the knowledge and improving the practice of each of its members, as well as to benefit humanity at large, and to establish a line of demarkation between the qualified and the unqualified, by refusing to admit to membership those not regarded as qualified to practice, or as fit associates for gentlemen.

The elect only were at first allowed to become members of this society, and none could be elected without first getting three members of the society to vouch for his unbroken pedigree of respectability, running back well-nigh to the time of the Charter Oak. The early members of this glorious old American Society of Dental Surgeons had most decided ideas as to the requisites necessary to constitute a true professional gentleman, and they desired no others for associates. At the time of the formation of this society the number of what they regarded as respectable practitioners in America, including Canada, was so few that all told those considered fit for membership did not exceed about one hundred. At the first annual meeting, 1841, there were personally in attendance but thirteen members, and by proxy or letter twenty-three, though after some seven or eight years the membership reached about one hundred. Among those present at the first meeting are to be found the names of such early stalwarts in the profession as Hayden, Parmly, Brown, Foster, Maynard, Trenor, Greenwood, Tucker, Hudson, and Harwood, as well as that earnest leader, Chapin A. Harris, whose many well-

directed efforts did so much to advance the science and elevate the practice of dentistry that his name and memory will be cherished and honored by the practitioners of our art so long as humanity shall need the services of the profession.

The years 1839, '40, and '41 are generally considered as the most important epoch in the history of dentistry. In 1839 Dr. Harris commenced the publication of the *American Journal of Dental Science.* During this year was organized, as before mentioned, the American Society of Dental Surgeons, and in 1840, through his efforts, was founded the Baltimore College of Dental Surgery; and during these and a few subsequent years was demonstrated more fully than at any other time the potent influence of associated effort for the upbuilding of the science and art of dentistry. The organization of the Baltimore college is often spoken of as the great event in the history of dentistry, and no one should attempt to belittle its influence for good; but it may be seriously questioned whether at this time a dental college could have been sustained but for the influence and moral support of the American Society of Dental Surgeons.

Dr. Harris, as all acquainted with him well know, was a man of broad views, and he had in a most remarkable degree the faculty of creating and combining influences for the furtherance of objects in which he was interested.

His first desire, as all know, was to connect a dental school with the medical department of the University of Maryland, thereby securing for dentists such medical teaching as was then thought necessary, and at the same time establishing it as a legitimate specialty of medicine, and securing for it, as such, the support of the entire medical profession.

But a dental college, without some combined support back of it such as had been hoped for through the medical profession, would have been almost certain to meet with failure. No doubt this fact was appreciated by Dr. Harris and his associates, for they were just at that opportune time foremost in bringing about the organization of the American Society of Dental Surgeons. At its first annual meeting (1840), and just after the close of the first session of the Baltimore college, the publication of the *American Journal of Dental Science* was assumed by the society, and Dr. Harris, the dean of the college, was elected editor-in-chief.

By this combination, as was intended, the associated influence of the society and of the leading dentists of America as well as of Europe was brought to the support, and secured the success, of an otherwise doubtful undertaking.

Many of the members of this society were medical men, and therefore appreciated the value and importance of medical knowledge in the practice of dentistry; they were also indoctrinated into the idea that secrets in the practice of any department of medicine were contrary to the best interests of humanity, and consequently unprofessional. The endeavor, therefore, of each member of the society was to do all in his power for the enlightenment of his fellow-members.

For the first few years the proceedings of this society were dignified, harmonious, and instructive; indicative of close study and careful observation; and conducive to a spirit of energy and liberality among its members, and also among those who read its transactions as published in the *Journal*.

In this way much was done to support the Baltimore college by impressing upon all the importance of a better education on the part of those who intended to engage in the practice of dentistry; and it is safe to say that much of the exalted position which we occupy to-day as professional men is due to the work done and the influence created by this society during the few years of its existence.

Notwithstanding the great good this society accomplished during the first six or eight years of its existence, and still had promise of doing, its usefulness was cut short by the gradual introduction of members who sought its portals more with a view of advancing their own private interests, by creating the impression that they were men of science by virtue of their appearing to be the associates of scientific gentlemen, than from any desire they had to learn or to make themselves useful in adding to the knowledge of others. These men soon made themselves so conspicuous and troublesome as parliamentarians, constitution-tinkers, and politicians, in their attempts to secure control of the society, that, coupled with the dissatisfaction created by what is known as the "amalgam controversy," it caused most of the older and more useful members to become disgusted. They lost their interest in the proceedings of the society and refused to attend its meetings, and as a result it soon lost its usefulness and passed out of existence in 1856.

The great benefits of combined effort for the development of the science and art of dentistry were everywhere acknowledged, and, as it had become evident that the society's days of usefulness had passed, steps were taken in 1855 looking to the formation of some other national association. As to just what the character of the

organization should be there was considerable diversity of opinion. Some contended that so long as practitioners of semi-respectability were excluded from membership in the American society, its work was harmonious and useful, but that as soon as any considerable number of objectionable members were admitted, discord and unpleasantness were the result, and that therefore the new organization should be exclusive in its character, with provisions to keep out objectionable persons.

Others contended that loss of interest and the failure of the old society were due not so much to the admission of the class of men just referred to as they were to the controversy and bitterness manifested over the resolution passed by the society in regard to the use of amalgam; and that the leading idea of the new organization should be the "leveling up" of the profession by admitting all practitioners, with little or no regard to their professional or moral qualifications, with the hope that thereby the masses of the *so-called profession* might, by contact and intercourse with its leading spirits, be encouraged and stimulated to self-improvement, and thus elevate the standing and practice of the profession generally.

This last idea prevailed, and the American Dental Convention was organized in 1855 in the City of Philadelphia, without by-laws or constitution, and with its doors open to all practitioners of dentistry, regardless of their moral or professional qualifications.

To this movement no inconsiderable number of the best men then engaged in the practice refused to lend either their moral or personal support, and persistently declined to attend the meetings of the convention, claiming that their participation or presence upon an equal footing in assemblages composed so largely as this must be, of men for whom they had neither personal nor professional respect, would be construed into an acknowledgment of the fitness of these men, and they felt that their knowledge of the facts, their duty to their calling and to the people at large, would not permit their concurrence, and they therefore acted accordingly.

Many of our best men, however, gave to the movement their support during the first few years of its existence, and at its first annual meeting Dr. Harris, the old Nestor and leader, more against than in accordance with his wishes, was forced to the front and made president of the convention, and no one who was present will ever forget with what dignity and fatherly solicitude he presided over that meeting and tried to direct the proceedings and preserve order in that disorderly body.

Yet, considering the elements of which the convention was com-

posed, the discussions upon the limited number of subjects introduced were instructive, and many ideas of practical value, as well as improved methods of practice, were presented; but as a whole the papers and discussions of the convention did not compare favorably with those of the earlier society, as anyone can see who will take the trouble to read them. Soon after, some of those who were active in the first meeting began to realize that the objections urged against a convention open to all and without fixed rules were being practically realized. They therefore withdrew their support and declined to further attend the meetings, and what little vigor and activity of thought was left waned, and in 1880 the convention passed out of existence.

Many pleasant thoughts and memories, however, cling around the old convention. It was in it that many of those who have for the last thirty years been engaged in the exacting duties of active professional life, and who have by all means within their control done all in their power to advance the standard of dentistry, first met those veterans whose names will always be conspicuously remembered in connection with our profession's early struggles for acknowledged usefulness and respectability. It was in this convention that many of our young practitioners from the widely-separated parts of our country formed acquaintances and ties that have been both pleasant and profitable as they have labored together for the common interests of our calling.

With the many defects that this convention had in its organization, it is more than likely that it was the best that could have been devised under then existing circumstances, and no doubt the good that it did was far greater than any unfavorable results that came from it. It was one of those peculiar creations, a mixture of incongruities, that the exigencies of the times seemed to demand, and when it had served its purpose it passed away.

Some years prior to the final dissolution of the American Dental Convention, the late Dr. J. H. McQuillen and several other gentlemen took steps, at Niagara Falls in 1859, and at Washington in 1860, to organize the present American Dental Association upon a basis of delegate representation. While freely admitting that an organization open to such unrestricted membership as was the American Dental Convention was probably useful to such practitioners as had not availed themselves of college or even good office instruction, they still felt that such an organization was not so well adapted to fostering the systematic scientific research so imperatively demanded by

the needs of the profession, as would be one composed of representative men selected by their confrères in different parts of the country because of their fitness to conduct research and take part in the discussions of a scientific body. But it is, I believe, an historic fact that no important undertaking was ever proposed or planned, no matter how desirable or how great its promise for good might be, which did not meet with opposition. The proposition to form this Association was no exception to the rule, for no sooner was the suggestion made in our journals than it was met by communications ridiculing the idea and opposing it in the most vigorous manner. Resolutions, even, were passed at public meetings, for which some most excellent gentlemen voted, declaring that "no evidence existed of the necessity for a delegated national body of dentists, and that it was the duty of every dentist who desired the advancement of the profession to oppose the creation of an organization based upon delegate representation." Nevertheless, the wheel of time and progress moved on.

Had these gentlemen been aroused from their professional slumbers during the last two years, I have little doubt that they would have been found passing resolutions against the organization of a section on dental and oral surgery in the Ninth International Medical Congress, and that they would now be speaking disparagingly and using their influence against the resolution recently passed by the American Medical Association admitting graduates of dental colleges to membership in that body. And still the same old time-honored wheel keeps moving on.

Were it possible for these gentlemen to have rubbed their eyes open sufficiently wide to see the progress that has been going on, they might have come to the conclusion that the late action of the American Medical Association was not entirely disinterested, for medical men are rapidly coming to the conclusion that dentistry as now practiced is not entirely a mechanical pursuit, and that there is much in its science that it would be well for them to know; and they have thrown wide open their doors, and invited us to come in and sup with them that they may sup with us.

At the preliminary meeting of the American Dental Association, held August 3, 1859, twenty-eight years ago, there were twenty-nine delegates present. Two colleges and eight societies were represented. Little was done at this meeting except to submit a draft of a constitution and lay it over for action at the next meeting, which was appointed to be held in Washington the following year. At

the meeting in Washington only twenty-six delegates were present; this falling off being largely due, no doubt, to the influence of the opposition, which left no stone unturned to heap ridicule upon the undertaking. Nevertheless, without faltering and with good courage the organization was perfected and the American Dental Association entered upon its work. At this meeting there were presented five carefully-prepared and valuable papers. The constitution adopted provided for associate work during each year in every department of our field of science and art, by establishing permanent committees for that purpose.

With the view of breaking down local jealousies, then so general, and to establish in their place agreeable and fraternal relations, to foster a desire for individual improvement, and to beget that *esprit de corps* which not only tends to, but is important to, the self-repect of its members, and to the dignity and usefulness of any profession, a committee was appointed for the purpose of conferring with practitioners at different points and securing the organization of local societies in various sections of the country, and also with the further view of making those societies tributary to the national association.

As an evidence of the fulfillment of the hopes then entertained and which gave rise to the appointment of this committee, it is only necessary to state that in 1858, after nearly twenty years of labor on the part of the American society and the American convention, there were, so far as I can learn, only some four or five local societies in practical operation in the United States; while to-day there are over sixty societies and twenty-five dental colleges, and the amount of good which they are accomplishing in their various localities, as well as through their delegates in this Association, can but be most gratifying to all who have the best interests of our profession at heart. That the organization of these societies has been largely due to the influence of this Association, no one, I think, will attempt to deny.

From the first it has been the evident desire on the part of the large majority of the members of the Association to make its assemblages pleasant as well as profitable to both themselves and the profession at large. That these efforts have been prolific of success need not be argued, for not only have the acquaintances there formed often ripened into the closest fraternal relations between individual members, but in some instances the sorrow and tears of the Association have been mingled with those of kinsmen for the

departed. Many of the papers and discussions read before the Association and published in the Transactions evince such careful study and accuracy of observation, that they will be read with benefit wherever dentistry has become a science.

From its first meeting down to the present time, the Association has been instrumental in encouraging our dental colleges to establish a high standard of preliminary education as a requisite to matriculation, with a broad and comprehensive curriculum of study as a necessary qualification for conferring the doctorate degree in dental surgery.

As a rule, those engaged in educational institutions of all kinds desire to extend the curriculum of study and improve the course of instruction, but feeling that to do so would not be appreciated, and would therefore so decrease their income by a loss of patronage as to greatly impair their usefulness, or possibly to close their doors altogether, they are many times induced to pursue a course of instruction far less thorough than they desire to or than would be for the best interest of those whose education is committed to their care. In no department of education is this more true than in our dental colleges.

Away back in the centuries dentistry was regarded practically as a specialty of medicine. The propriety as well as the desirability of such a connection was fully acknowledged in later times, when the leaders of what may be termed modern dentistry undertook to establish its teachings as a department of medicine in a medical college, as also when practitioners of dentistry sought admission to medical societies as practitioners of medicine. Failing in these efforts, like sensible men, they adopted the very best expedient possible by establishing independent dental colleges and societies of their own. It was not, therefore, from choice but from necessity that we have, separate from medical colleges, distinct schools for the teaching of dental surgery. And it was from necessity rather than from choice that our schools and our interests ran away from rather than with the medical profession, and we became what many choose to term an "independent profession."

Refused permission to teach dentistry in a medical college, Dr. Harris and those conspicuous with him in the effort to advance its science and elevate its respectability, sought to make it an important department or specialty of medicine, rather than an independent profession, as some now advocate. That this statement is correct is evident from Prof. Harris's opening lecture in the Baltimore College

of Dental Surgery. "Allow me," he said, "to observe, however much of interest or curiosity the establishment of this institution may have awakened, it constitutes an era in the history of a most useful and valuable *department* of medicine." In speaking of the empiricism that had up to that time existed in the practice of dentistry, he says: "I feel bound to the public and to my own reputation to denounce the empiricisms that have and do still exist in this *department* of medicine." Again he says: "It is to be hoped that the day is not far remote when it will be required of those to whom this department of surgery is intrusted, that they shall be educated men."

Whenever Dr. Harris or those of his day spoke of the dental *profession*, they spoke with the same relative meaning that attaches to "surgical profession" as generally used in England,—and to some extent in this country,—meaning the dental or surgical department of medicine, and not "dentistry" or "surgery" as an "independent profession." Those veterans had a pretty correct idea as to the fitness of things, as well as a very clear way of expressing their wishes and intentions. That they were right in their opinion as to the advisability of connecting dental with medical teaching in a medical college is now being demonstrated by the fact that in none of our dental colleges are students any better—if as well—educated in the fundamental principles of anatomy, physiology, chemistry, materia medica, and surgery (no less essential to the highest degree of excellence in the practice of dental surgery than they are in the practice of any other department of medicine or surgery) than they can be in those schools where they receive their teaching jointly and pass these chairs upon an equal footing with regular medical students. Those schools, however, which are separate from medical colleges should so increase requirements that their course in the above-mentioned studies will be accepted by the best medical colleges as equal to their own. With such a course dental students may be considered prepared to make intelligent students in dental surgery.

From the earliest days of dentistry there has been a feeling on the part of those who practiced it that it should be regarded as a department of medicine. That the treatment of the teeth is as much a specialty of medicine as is the treatment of any other part of the body does not admit of debate. It is a self-evident proposition. But whether those who practice dentistry *are* medical specialists is another and a very different proposition, its solution depending upon whether the party practicing it has the requisite medical

knowledge to enable him to treat the diseases that come within the scope of his practice with a proper medical understanding. If he has this knowledge, it matters little whether he gets it from a medical or from a dental college. If from the latter, he is in fact, though possibly not in accordance with hitherto accepted custom, entitled to be considered what he really is,—a special practitioner in medicine; and this is what the founder of dental colleges from the first intended. But it is an undeniable fact, as we all know, that the teachers in and the graduates from, some of our dental colleges do not, as a whole, believe that they are from education entitled to be considered medical men. To this must be added the further fact that while the faculties of some of our colleges fully appreciate the importance of and insist upon thoroughly grounding their students in the fundamentals mentioned, there are others who, though they have chairs for the ostensible purpose of teaching those branches, merely go through the forms of teaching most of them, and make the degree of "doctor" as easily attainable as possible, in order to fill their own pockets by increasing the number of their pupils. Some of these colleges—and their number is increasing—are but low-priced incorporated dental offices, legally established as educational institutions for the purpose of increasing the "professor's" own private practice by virtue of the *éclat* that attaches to a person dubbed "professor," and for the money made out of the college in the way of clinics, fees, and the sale of unearned diplomas.

Some of these "professors" have held prominent positions in this Association, as well as in the association of dental college faculties, and I do not hesitate to say that unless the cause for criticism in regard to this matter ceases, the college association should purge itself of all connection with such colleges, and this Association should refuse to receive delegates from them, no matter whether they be new or old institutions.

That the method of dental instruction at medical colleges is gaining favor, and that the original ideas of Dr. Harris and his confrères in regard to dental education, with such modifications as the changed condition of things will permit, will prove of great advantage to the dental graduate is evident. Nor do I doubt that this plan, or something akin to it, will in the near future be very generally adopted. With a little change the present curriculum will lead to a well-grounded education in all the fundamental principles of general medicine. When we add to these special clinical and didactic teaching, the graduates of such schools will become legiti-

mate practitioners in a department of medicine, just as surgeons are in England, but like them not practitioners of general medicine.

In the process of evolution time and circumstances have brought us to another important epoch in the history of dentistry, in which our dental colleges and associations are to play an important part. The hope which was indulged in by the pioneers of an educated dentistry in this country that, through the influence of dental colleges, the science and art of its practice would be so advanced that it would be regarded as "a most useful and valuable department of medicine," has by the highest medical authority in the land been acknowledged as fulfilled, by the passage of a resolution by the American Medical Association admitting graduates of dental colleges to full membership in that body. The resolution referred to reads as follows:

"*Resolved*, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education and a term of professional study equal to the best class of medical colleges in this country, and *embrace* in their curriculum all the *fundamental branches of medicine*, differing chiefly by substituting practical and clinical instruction in dental and oral medicine and surgery in place of practical and clinical instruction in general medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in the association on the same conditions and subject to the same regulations as other members."

As fears have been expressed in some of our dental journals that possibly this resolution was too hastily prepared and perhaps passed without due consideration, I will say that I have personal knowledge of its having been prepared weeks before the meeting of the association and most thoroughly considered in all its bearings. That it was not passed without due consideration by the association is evident from the fact that the mover (Dr. Davis) offered the resolution on Thursday morning, when the largest number were present, and then asked to have it laid over for action until the following day, in order that the members might have time to talk it over and consider it in all its aspects. This was done and the question was very generally discussed in private between the sessions. When the resolution came up for consideration, Dr. Davis gave his reasons for its introduction and it passed with great unanimity.

As the query has been propounded in some one of our journals as to whether the graduates of all dental colleges will be eligible to membership in the American Medical Association, it may be proper to state that, while great liberality will undoubtedly be exercised toward all previous dental graduates, it will be well that all dental

colleges desiring to insure to their future graduates unquestioned eligibility to membership in that association shall require of them, in good faith, as requisite to matriculation, a preliminary examination or evidence of a good English education in the form of diplomas or certificates from some high school or college, and, as requisite to graduation, a three years' course of professional study. This course should include general chemistry, general and microscopical anatomy, physiology, pathology, materia medica, and general surgery; for no one can become even an intelligent student of a specialty, much less a practitioner, without first having acquired a knowledge of the fundamental branches; but with these, coupled with such other teaching as is necessary to the intelligent practice of our calling, no department of medicine could be practiced with more satisfactory evidence of usefulness or with greater respectability than that of dental surgery.

The question has also been raised as to whether the admission of dental graduates to the American Medical Association might not result in the building up of the section on dental and oral surgery in the American Medical Association, and that it might result finally in the disorganization of this Association. For the present at least there need be no anxious apprehensions in regard to this matter. Let us trim the sails and steady, rather than scuttle, the good old ship.

As handicraft—manipulative skill—has well-nigh reached its limits in dentistry, upon the more thorough and appropriate medical education of those who may hereafter enter upon the practice of dentistry must its advancement and greater usefulness mainly depend. To this end, therefore, let this Association, grasping the strong right hand of the American Medical Association, in friendship extended,—by resolutions, provisions for membership, and by every other means within its power,—direct its great moral influence.

SECTION II.

Dental Education, Literature, and Nomenclature.

Report by LOUIS OTTOFY, Secretary of the Section.

SECTION II, Dental Education, Literature, and Nomenclature, begs leave to submit the following as its annual report:

The possibility of the postponement of this year's session, as well as the uncertainties surrounding the probable time and place of holding this meeting of the Association, have made it impossible to secure any aid from members of the Section. Hence this paper and two other short papers are the result of its labors.

Part I.—Dental Education.

While nothing of special importance affecting dental education in the United States has transpired during the past year, there seems to be a concerted general movement and desire to elevate the art and science of dentistry by means of education, and to raise it from the creditable position which it has acquired during the last decade to a still more exalted plane. Thus the many occurrences tending to bring about this result are of sufficient consequence to be noted in this report.

The number of schools devoted to the special education of dentists has increased from twenty-four to twenty-eight during the past year. These schools are located in fifteen States and the District of Columbia, as follows:

California	1	Michigan	1
Georgia	1	Minnesota	2
Illinois	3	Missouri	3
Indiana	1	New York	1
Iowa	1	Ohio	1
Kentucky	1	Pennsylvania	3
Maryland	2	Tennessee	3
Massachusetts	2	District of Columbia	2

Of these, one is devoted exclusively to the education of the colored race, some admit both races and sexes, while others are confined entirely to white males. From twenty-five of these schools there have been graduated since the last meeting of this Association 597 students. From one school no report has been received, and two of the twenty-eight colleges have not yet held commencements.

To the resolution adopted by the National Association of Dental Examiners, and which reads as follows:

Resolved, That this association instruct its members after June, 1885, to recognize as reputable no dental college which does not require as a requisite for graduation attendance upon two full regular courses of lectures and clinical practical instructions, which courses shall be of not less than five months' duration, and shall be held in separate years, with practical instruction between the courses, and that does not require preliminary examination of applicants before matriculating them,

at present twenty-five colleges do conform, the Dental Department of Howard University having recently declared its intention to be governed by it; two colleges—namely, the Dental Department, National University, and the Dental Department, University of Tennessee—do not conform; and one school recently organized in Missouri has not yet issued its announcement. It will thus be seen that there are but two schools in this country which will graduate students who have attended less than two full courses of lectures.

Pursuant to the following resolution, referred to this Section by this Association at the last annual meeting:

Resolved, That this association would recommend to the various dental colleges of the country that the interests of higher education demand that the college course of instruction be uniformly extended to nine months in each year,

the secretary of the Section has sent copies of the resolution to all the deans of the various dental colleges of the country, and presents as a result of such inquiry the following:

From five schools no reply has been received, and from twenty-three replies the following extracts will illustrate how the subject was received:

One says:

"For the present, at least, this college could not think of entertaining for a moment such a proposition; it would be impossible to do so, and this matter should more properly come up before the college association."

Others say:

"This college has already extended its course to nine months, and to three years, and will continue to hold that position."

"The course of practical instruction in this college occupies twelve months in each year. The regular course of lectures, fifteen each week, is five months in length. A spring course of two months, ten lectures each week, follows. The subject of increasing the regular course considerably is under consideration now by our faculty. It will be done soon, I think."

"The winter session of this college is five months, though we have lectures and clinics nine and one-half months in the year, which about one-half of the class attend. The time is not far off when we shall adopt a nine-months' session."

"As to your proposition, it is new to us. I will, however, submit it to the faculty at its next meeting."

"As far as I am able to judge, the heads of this college regard favorably an increase of the present term of seven months; but I feel equally certain that the faculty is not favorable to a nine-months' term; certainly not for this latitude, where we run into violent heat. Eight months might be a satisfactory compromise."

"This dental college organized thirteen years ago with a six-months' course, and for the last three years has had a full nine-months' course each year. I am gratified to say that this is more satisfactory to all concerned than the shorter term. The American Dental Association did well to give utterance to this resolution, and if need be it should be reiterated each year."

"Our school gave the last term, preliminary course, one month; regular session, five months; spring course, two months; the last confined almost entirely to the practical. We will not adopt the nine-months' term, I think, but shall shape our teaching for the best interests of the students as we see it."

"Our present arrangement is for six months, but you may rest assured that this school will endeavor to appear in the 'rank and file' of the very highest order of dental education. I am heartily in favor of the nine months."

"We have had a nine-months' term since 1875. No winter, summer, and fall sessions, but a continuous lecture and clinic session beginning the last week in September and continuing till the last Wednesday in June, with two short vacations of about nine days each at Christmas and Fast week."

"Our college already requires one month longer course than most of the dental colleges of the United States, and I do not think we are in favor of making the session longer than it is at present. I confess that nine months is none too long, and I am selfish in not

being in favor of the movement; but we are giving our time, and have been since the college was organized, without pecuniary reward, or hope of any. The drain upon our time is considerable, and I for one certainly will not consent to increase that time three more months during the year."

"At the last meeting of our faculty the matter was considered and talked over for some time. We are all decidedly in favor of it. So also is the board of regents of this university. The only difficulty in the way here is finances. The present appropriations are not sufficient to cover the expenses of the change. However, as the executive committee of the board was in session to-day, I went before them with your letter. They made this statement officially: 'We are in full sympathy with the change, and if the funds were adequate would urge its adoption by the board; but as the appropriations at present will not cover the extra expense, we can only say that in our plans of action for increased appropriations this will be a factor, and a strong effort to secure it for the purpose will be made.'"

"In our announcement for 1883 we gave notice that our session of 1884 would be of nine months. Each session since that time has been of that length. I think our college was the second in the United States to adopt a nine-months' term, and we are well pleased with the result."

"The full course of this college is made up of fall, winter, and spring terms, nine months in all."

"The board and faculty are opposed to terms of nine months, for the reason that it affords no time for repairs and keeping up the properties of an institution, and that the faculty of this college labor hard and faithfully during five months of each year for the benefit of students, and they should be permitted to rest from such labors and devote some time to business and recreation. The proposition for nine months certainly did not come from a laborious faculty. Therefore, this college favors three terms of five months each, as affording a better system of rests for students, whom nine months of strain would probably injure physically, mentally, and financially. Very few young men have the cash to remain at college over five or six months at a time."

"This college in a course of six months embraces a greater number of lectures than is delivered in those schools which have increased their terms to nine months. When we add to this the spring course of three months, and still further add the summer instruction, we

exhibit a more lengthy course than in many nine-months' schools. Our college is not likely to change its course of instruction soon, nor will we lengthen it. We now have didactic lectures nine months, six of which are obligatory, and instruction is given to students during the entire year. I would suggest to you that you procure the lecture schedules of all the dental colleges, and satisfy yourself as to how many lectures are given in each. There is more moonshine about this nine-months business than anything else. Its principal value is in the extending of time for the practical work."

"Our academic year consists of nine months."

"We are not likely to adopt the nine-months' term."

"This college has adopted the nine-months' term (by resolution passed by the board of directors in January last). I can officially certify to our hearty indorsement of the resolution in question."

"Cannot upon so short notice consult faculty. Think may safely say they would not favor a nine-months' session. It is very probable we now give quite as much instruction in the 'fundamental branches of medicine,' and theory and practice of dentistry, as certain dental departments who have longer sessions."

"On account of the financial condition of our students, it will be quite difficult if not impossible to extend the length of our session to nine months. We think it will be better to require three sessions of five months each than two of nine months."

"This college will favor the resolution, and will with the other reputable colleges do all it can to extend the term to the length of time recommended in the resolution."

"I can state that this dental department gives twelve months in each year as a college course of instruction. Our collegiate year is divided into two sessions of five and seven months, the second beginning as soon as the commencement exercises are over.

"Our school has not taken action as yet on the recommendation of the American Dental Association. We will be governed in a manner by the medical department, as we are only a part of the college."

Before referring to the status of dental education in the United States, the consideration of the status of dentistry in foreign lands may be interesting.

In Great Britain the degree has a national character, and while the error permitting promiscuous registration at the time of the enactment of the law has been injurious to the profession, when the time comes that the registers are clear of the names of men of questioned

professional standing or ability the condition may be more wholesome than in the United States. Mr. Morton Smale, dean of the Dental Hospital of London, fitly says in connection with this subject:

Speaking of those who are ashamed of their vocation, because there are black sheep on the register, he very truly remarks that "they might with equal justice be ashamed of their humanity because there are members of it who habitually disgrace it; the best of mankind, however, 'walk not on the other side,' but endeavor by good example and providing education to raise the renegades to a higher standard of morality and self-respect." Of the preliminary examinations, he strongly recommends the matriculation of the University of London, as being the most all-around in its subjects, and the portal through which the student may pass into almost any department of medicine, science, or art, should he so wish, at any future time. The regulation now in force at the Royal College of Surgeons of England, requiring an apprenticeship, he hopes will never be rescinded, for it is impossible for a thorough practical experience in dental mechanics to be gained at a dental hospital. He then passes on to the question of the desirability of taking the M.R.C.S. and L.R.C.P. in addition to the dental diploma, giving many apt examples of the value derived therefrom, and shows how this can easily be done by the moderately hard-working student.

Perhaps the example of the German Government is the most favorable one to imitate. In that country dental education has been under the control and direction of the general government since 1852, as much as the United States army and navy are under the control of the United States Government, and therefore all of the legal dental colleges are the departments of thoroughly equipped universities controlled by the government, and supplied with corps of teachers whose talent and education are above reproach. Dental departments are established in many of the universities, and the curriculum comprises all branches of dentistry.

In Austro-Hungary dentistry has not hitherto presented a very favorable aspect. "The opportunities for perfecting one's self in dentistry in Hungary are very meagre indeed. They have been so for fourteen years, although, perhaps, not to a greater extent. Before that time dentistry was taught by an 'extraordinary teacher,' with whom occasionally some private tutor divided that honor. But even then the subjects embraced in the course were not divided between the two, but both were teaching the same subject under the term of 'general dentistry.' The special dental examination was

optional, and only such obtained the diploma conferred who chose so to do; the possession of the document was virtually without an object, either as a certificate of legality or qualification; as the former was already conferred by the 'surgical' examination, and by the latter the fact of qualification was not established by reason of the excessively lenient examination to which the candidate so readily submitted.

"At present, however, the passing of a dental examination, which is still more lenient than formerly, is not legally prescribed.

"Virtually, then, it may be said that the entire teaching of dentistry for the whole of Hungary is being conducted by one person, and he a private tutor of the University of Budapest, who is thronged by the thirsty aspirants for knowledge, as nowhere else in the entire domain of Hungary can they listen to the teachings of dentistry.

"According to the conditions just described, it is absolutely necessary for anyone wishing to perfect himself in dental science to visit foreign countries,—to go at least to Berlin, but advantageously even further; or to become apprenticed for several years to some first-class private practitioner, which in this (that) country is done with difficulty and accessible to but few. In other countries the establishment of dental colleges has been found essential. The need for them exists in Hungary as well, and the demand ought to be supplied, but by thorough and well-equipped schools, so that those who desire to perfect themselves may do so at home. Whether the plans now under advisement by the minister of education, when carried into execution, will fully meet these wants remains to be seen."*

In France restrictions governing the practice of dentistry and the qualification of practitioners have but recently been enacted. G. C. Daboll, M.D.S., of Paris, France, writes (*Dental Review*, Vol. I, No. 1, pp. 42, 43) of the condition of dentistry in that country as follows:

"There exist to-day two schools in Paris devoted to the interests of the dental profession. In both of these schools the student can get instruction in every department of our science. It would be too much to claim now that practically he would gain as much as in one of our best American institutions, for these schools are young, and the demand of the French people does not call for as high a standard of practical education. In certain branches no schools in

*Joseph Iszlai, M.D., Budapest, Hungary, in *Dental Review*, Vol. I, No. 2, pp. 98, 103.

the world give greater facilities than these for the attainment of the best education the student could desire. In anatomy, physiology, pathology, therapeutics, chemistry, materia medica, surgery, etc., the student has every advantage. In prosthetic dentistry the French dentists are skillful to the point of giving the highest finish to their work; but in this department, as in operations on the natural teeth, the demand has not stimulated them to overcome the difficulties of adaptation; consequently one sees many defects in artificial dentures.

"In operative dentistry, from a scientific point of view, the French are in their infancy. In an old civilization like this it is a slow process to change the established order of things, and especially where it must be for a long period a pecuniary loss to the profession. There are many men in the dental profession in France capable of doing excellent work, but the impossibility of attending to from twenty to forty patients daily is an effectual bar to the exercise of one's best gifts.

"The 'fee system' of charges for professional services is undoubtedly the reason why dentistry in this country has not, in the years past, attained higher excellence. The operator who receives no greater fee for an operation requiring an hour for its performance in one way, which can be completed in fifteen minutes if done in another way,—especially when he has fifteen patients awaiting his services in the reception-room,—is not likely to give the patient in hand the benefit of the longer time and greater excellence; and he is not to be held responsible entirely for this. The patient, in the majority of cases, asks no more, expects no more,—in point of face, decidedly objects to more.

"This condition of things can only be revolutionized by education,—first of the dentist, second of the people; and the first step was taken in 1880, when the Dental School and Hospital of Paris was founded by public subscription and a subvention from the city of Paris. The course requires three years, upon the completion of which the graduate receives the diploma of the dental school (diplome de l'École Dentaire de Paris—D.E.D.P.).

"Dr. M. M. Levett, an American dentist, occupies the chair of operative dentistry. It must take years, as a matter of course, before the effect of this school will reach the people; but it is sure to come."

In Switzerland there is a dental school at Geneva, and for admission to practice special course examinations prevail.

"Hitherto the method in vogue of admitting dentists to practice

in Switzerland has been very incomplete and unsatisfactory, each canton having its own standard of admission and examination, which in some of them is very inferior and entirely unsatisfactory. Steps have been taken to secure the passage, in the *Bundesrath*, of an act to regulate the practice of dentistry, by requiring uniform compliance throughout the republic." *

"In Sweden the first step in the direction of procuring better facilities for the education of dentists was taken in 1878. The requirement of passing a preliminary examination was made obligatory upon those who commenced the study of dentistry. Thus, Sweden is one of the few countries where the standard of requirement is high; nevertheless, since the necessity of a preliminary examination, the number of students has steadily increased. As there are in Sweden no schools or dental departments where an entire education may be completed, students receive education in the mechanical branches from private tutors and in private offices. After having completed two years of study in this manner, the candidate is subjected to an oral examination in chemistry, physics, metallurgy, etc., and to a practical examination comprising the manipulation of the metals and plastics in prosthetic dentistry.

"Having successfully passed such an examination, the candidate receives employment as an assistant in the office of his preceptor, whenever such a course is possible, and during this period his theoretical studies continue, comprising the dissection of the head and neck, lectures by private tutors on physiology, pathology, surgery, materia medica, etc., and attendance on clinics at the polyclinic of oral and dental surgery, erected and maintained for this purpose by the Swedish state authorities. This course comprises two years, and includes, in addition to the practical instruction, demonstrations, lectures on operative dentistry, the making of obturators and other appliances. Upon completing this course the candidate is subjected to a final examination before a board of examiners, consisting of a professor of surgery, a professor of anatomy, and a dental practitioner. The latter examines the candidate in all the practical branches of dentistry, which examination is made partly at his office and partly at the polyclinic, and comprises the making of one metal plate, one vegetable-base plate, one gold plate with clasps and suction-chamber; fillings of gold, amalgam, and other plastics; conservative treatment of the pulp, antiseptic treatment of decay, and the treatment of other diseases of the mouth. The examinations before the

* *Dental Review*, Vol. I, No. 5, p. 272.

professors of anatomy and surgery are entirely oral. No diploma or title is granted to the successful candidate, as the holding of a philosophical or medical degree only is recognized." *

"In Russia the qualifications necessary to entitle any person to establish himself in practice consist of, first, the possession of a certificate from a practicing dentist showing that the applicant has served two years as an apprentice; second, an examination in matters pertaining to dentistry; the standard, however, being a very low one, as the requirements hardly exceed the ability to extract teeth and answer to a few simple questions in anatomy. A dental school has recently been established in St. Petersburg, to prepare candidates for graduation, in which the principal branches—the practical ones—are but poorly organized, although the theoretical teaching is thorough." †

In Cuba the dental colleges and academies furnish poor and imperfect education. The institutions are turned into miserly establishments, conducted for pecuniary interest, and the fact that the dentists composing the board of examiners for the island are financially interested in the schools makes an unsatisfactory state of affairs.

"The Brazilian Empire at present has two medical faculties (*faculdades de medicina*), one of which is located at Rio de Janeiro, and the other at Bahia. The faculties are not private institutions, but are under government patronage and surveillance. At both of these universities instruction in dentistry is given, which differs but little from the medical course. In these institutions, as well as in those of Germany, the chairs of professors are occupied by men who have studied in Europe, whose ambition, almost fulfilled, is to elevate the Brazilian universities to the same high standard which those in Europe enjoy.

"Students in dentistry are required to attend a three-years' course in which the studies are divided as follows: First year, physics chemistry, and general anatomy; second year, histology, physiology pathology, and hygiene; third year, therapeutics, special surgery of the head, and dentistry in all its scientific and practical branches. After passing the examinations successfully the candidate receives the title of *cirurgião-dentista*, or surgeon-dentist, similar to the titles conferred in other countries except in the United States.

"As far as foreign dentists are concerned, it is exceedingly difficult

* Rudolf Skogsborg, in *Dental Review*, Vol. I, No. 5, pp. 270, 271.

† W. Schibbye, in *Dental Review*, Vol. I, No. 3, p. 161.

for them to locate in Brazil unless they are familiar with the language of the country, as all must submit to an examination in that language. Those who possess foreign diplomas, whether they are Brazilian subjects or not, are obliged, first, to have them approved by the Brazilian consul or minister in the country in which they studied, and the various consuls of Brazil are instructed to approve none but the diplomas of recognized and reliable universities; second, the diploma must be approved by the local consul in Brazil, the minister plenipotentiary or chargé d'affaires, and finally by the minister of foreign affairs of the Brazilian Empire. After having thus been approved, the holder of the document is entitled to an examination without attending either of the Brazilian universities. This examination extends over a period of from three to four weeks, and comprises the subjects of anatomy, physiology, histology, physics, chemistry, hygiene, pathology, therapeutics, special surgery of the head, and dental science in its theoretical and practical phases, or in other words the same examination that is required of a three-years' course student in the universities of Brazil. Accordingly, Brazil in this respect is in the front ranks. The law against violators is administered with severity. The offender practicing without authority is fined for the first offense seventy-five dollars; for the second, two hundred dollars; and the third offense is punished by from three to six months' imprisonment." *

From these reports of the condition of dentistry in foreign countries it may be safely asserted that the education of dentists is receiving more attention than in the past. This is also true in a more marked degree of the profession in the United States. A healthy, progressive upward tendency prevails, and it will result in bringing the profession nearer to perfection. The colleges are more thoroughly equipped for the education of dentists than in the past. While many of the schools are independent of medical colleges or universities, and while in that position they succeed as well as those more favored by prominent connection, it may be safely asserted that the true and proper principle, the one insuring the diploma of a dental college the respect it should command at home as well as abroad, consists in union with well-organized and thoroughly equipped universities. But in the selection of such connection, State or national institutions should be the only ones considered.. Sectarianism ought to be held aloof from the education of dentists; hence

* Translation in *Dental Review*, Vol. I, No. 2, pp. 106, 107, from *Corres. f. Zahn.*

the union of dental colleges with sectarian institutions, with the object of securing the patronage and respect conferred by the name, are deleterious to dental education. Although many independent dental colleges, sustained by private enterprise, are doing their share toward the proper education of dentists, it is safe to assert that a school from whose interests the monetary question is entirely eliminated is in a better position to do the most good as an educator.

"The opening of a school devoted especially to the education of the colored race marks a new era in the progress of dentistry, in affording them an opportunity to educate themselves, untrammeled by questions of race or color, in a school of their own. It is to be hoped that the college may receive its full quota of students, and send forth an army of educated colored men, who will elevate and teach their fellows in regard to their dental organs. Hitherto there has been no good opportunity for the colored man of education, sense, or taste to procure proper service at the hands of the white dentist; most of whom do not wish to have colored patients enter their offices, and, if they condescend to do anything for them, it would be perhaps the extraction of a tooth in some dingy corner of the laboratory. The colored population of the United States in 1880 numbered something over six and a half millions. A large number of these people are well educated; many of them are well-to-do and respectable; they all unquestionably are in need of dental service, and they only lack the opportunity to better appreciate dentistry. Indeed, it is very questionable whether the prevalent idea of good teeth among colored people is well founded. Our own observations do not bear out that assertion. The colored dentist of the future, it is hoped, will soon prove beyond question that the teeth of his race are no exception to the common rule regarding their liability to caries." *

The traffic in dental degrees carried on a few years ago in the United States by unscrupulous speculators has at last been completely suppressed; not, however, before having exerted a baneful influence abroad, having lowered the dignity and worth of the degree and the profession of the United States, and having worked serious hardship to dentists in Germany—to dentists who are graduates of American dental colleges. While in Great Britain degrees granted by two American schools (Harvard University and Michigan University) are recognized, the German government (though never recognizing the American title or degree) tolerated its use by

* Louis Ottofy, in *Dental Review*, Vol. I, No. 1.

those entitled to it; but by a recent enactment has forbidden the use of any title, except that which would correspond to the term "mechanical dentist," to any persons unless they pass the examination prescribed by German universities. The same base traffic would have resulted in serious injury to the cause of dental education and to the standing of dentists as professional men in the United States had it not been for the seasonable passage of laws regulating the practice of dentistry in nearly two-thirds of the states of the Union. As an additional safeguard and fortification against unscrupulous venders of dental degrees, and for the common welfare, the various state boards intrusted with the enforcement of the law, having organized a National Association of Dental Examiners, have secured a fair uniformity of requirements in most of the states, and by resolutions seriously affecting the standing of those schools whose educational systems were not up to the required standard, they have secured in those institutions marked improvement. They have thus not only secured a fair uniformity of requirements, but later, by the organization of a National Association of Dental Faculties, the curricula of the various dental colleges have been made more uniform.

The preliminary examinations required of those entering the dental colleges have also exerted a wholesome influence, by admitting to the ranks of the profession principally those who will not only become worthy members but public educators as well.

A uniformity as near as practicable of the fees charged students by the various dental colleges ought to be secured by the National Association of Dental Faculties. The methods of advertising for patients for the infirmaries, pursued or resorted to by certain colleges, should be discouraged. The effect of such practices by dental colleges devoted to the education of students cannot be otherwise than demoralizing, especially when the character of the advertisements is of such a nature as would be entirely discountenanced in the individual practices of the gentlemen occupying chairs in those schools.

Dental societies and clinics are important factors as educators, and there is yet much to do in the various states in these fields. Illinois has followed the example of New York, and established four district societies, making with one already in existence five districts,—a northern, southern, eastern, western, and central. While in a body of the character of this Association clinics may not be absolutely necessary, they should not be neglected in state and other local societies.

The practice of educating dentists by pupilage under the care

of preceptors should be discouraged, unless offices devoted especially to this purpose are established, and unless they are in charge of persons who are teachers as well as dentists. It has been observed by those in position to know, that the student who has devoted some time before entering college to an apprenticeship is not as well fitted to take up the study prescribed by the college curriculum as he who comes with a good preliminary education, but untrammeled by uncomprehended ideas and vague suppositions, instilled by the practitioner too busy to devote time to him, or one entirely lacking in the ability to do so properly.

One of these shortcomings which may be noticed here, and which, we believe, is general in nearly all our schools, is "the lack of educating the dentist to the proper appreciation of prophylaxis. The student, as he now leaves the portals of the college, is too much the dentist, mechanic, and operator, and falls short in being the doctor and teacher. His time has been occupied with practical subjects; his energies have been bent in two directions, mainly and substantially, to fill teeth and make dentures. He has learned how to treat and how to save diseased teeth, and how to replace partial and entire loss of structure, but he has not learned that the work of the majority of dentists of to-day fails because of the ignorance of the masses in general. Many dentists, in consequence of not having had the idea firmly impressed upon them that without the proper education of the people all labor is worthless, plod on for years, perhaps, without in a single instance standing before their patients as doctors—teachers. They have stood there perhaps faithfully as operators, as mechanics, and, perchance, even as scientific men; but, notwithstanding all, they have failed to make good their title as teachers. Hence, dentistry is not making as rapid progress in the direction of education and prevention as it should. Almost perfection is attained in methods of repairing destruction and replacing loss of dental tissues, but there is not yet the full appreciation and understanding of preventing the necessity of such repairing and replacing.

"An earnest, serious impression should be made upon the student, before he leaves the college halls, of the grave importance of these questions. He should understand that he fails to perform his mission unless he proves himself an educator of the people, as well as a good, conscientious, honest operator." *

Dentistry in its relation to the state may be properly considered

* Louis Ottofy, in *Dental Review*, Vol. I, No. 2.

at this point. An English writer says that "in England the education of the dentist is three-fifths medical and two-fifths special, this special education being equal to the remainder of the medical education. It is thus recognized as a learned profession by the state, and we should endeavor to perform our duty in the service of the state. If medical appointments are made by the state when required, dental appointments should also be made. If dental services are required and not furnished, the interests of the state must suffer. Surgeon-dentists have been appointed to the Queen and to certain high officials, but such appointments should be extended to the departments, for the benefit of unfortunates, as in the India and other colonial medical departments, the post-office, prisons, police, and most assuredly in the army and navy. Indeed, as long ago as 1857 the army medical department recognized its shortcomings as regards dental service.

"The only thing done for the soldiers being the extraction of a tooth or the giving of a pill to allay pain, the surgeon usually leaves this ancient and limited treatment to the hospital sergeant, although where, when, or how this functionary acquires his skill must be left to the imagination, as no provision is made for it in his course of special instruction. Numbers of men are refused admittance into the army and navy of Great Britain on account of defective teeth. Dental surgery has no part in the special training at Netley required by the army medical department, nor is it included in the medical training of the candidate before entering the service. The army surgeon's education is not considered complete when he leaves Netley, but a special examination is imposed on him between his fifth and tenth year of service. To this examination could be added a clause requiring a knowledge of dental surgery, and attendance on lectures and clinics. Some surgeons have done this, indeed, and obtained the diploma from special schools, and these serve to indicate the feeling of the want of such knowledge. Perhaps purely dental appointments could be made, and each officer and soldier could be required to produce a certificate that his teeth and mouth were sound before going into active service in the field. The present surgeon-general of the United States army informed the writer that no general provisions have been made by the government for dentists for the troops. A regular dentist is on duty at West Point, and also at the Naval Academy at Annapolis, part of the time, and several accomplished dentists are in the corps of the hospital stewards, but these are exceptions. The medical department has tried

to arouse interest among its members in the care of the teeth by furnishing instruments when needed."*

Relative to the present status of dentistry, a recent writer in one of our dental journals thus expressed himself: "The facts are about as follows: There are now three or four per cent. of the dentists of the entire world who have regular medical qualifications, and they are engaged in the practice of dentistry as specialists in medicine. About two per cent. are Ph.G.'s, B.S.'s, or F.C.S.'s, and they do not practice as specialists in medicine. As near as can be estimated twenty to twenty-two per cent. hold the degrees of L.D.S., D.D.S., M.D.S., D.M.D., D.E.D.P., or hold certificates from state boards of examiners, or licensing bodies in foreign countries who do not confer degrees. Just how many of these believe they are practicing as specialists in medicine it is difficult to estimate,—probably not more than one-fourth at the outside. From this estimate, based on the statistics of all countries, we are led to conclude that about seventy per cent. of the dentists of the entire world are without medical or dental qualifications attested by colleges or licensing bodies."†

In the interests of better education, well knowing the baneful effects of ignorance and neglect, the Section would cordially approve the adoption of some means of educating children in the public schools throughout the land on subjects pertaining to dentistry. In a few remote and rare instances this has been done to a very limited extent. Just as the cause of temperance will grow, not by fanatical outbursts of ridicule or persuasion on the adult or matured mind, but by carefully reasoning with, and scientifically teaching the young the effects of alcohol on the system,—the baneful effects of intemperance and alcoholism,—so would the work we so ardently endeavor to accomplish be much simplified, aided, and abetted by properly educating the school children. Lectures by competent dentists should be delivered in the public schools throughout the land. In some of the schools, especially in larger cities, the subject of physiology has been introduced into the curriculum of even the grammar grades, and the popular method of teaching by the sense of the eye by illustration, as well as by other senses, has resulted in the execution of drawings representing various portions of the human body by boys and girls of less than fourteen years of age, which would do credit to a majority of adult persons. We have seen drawings of the bones of the face, including the maxillæ, which certainly approach perfection. Such practice must ultimately result in much benefit.

* Abstract in *Western Dental Journal* of lecture by George Cunningham, A.B., D.M.D., London, England, in *British Journal of Dental Science.*

† A. W. Harlan, editorial in *Dental Review*, April, 1887, page 341.

In France, perhaps, as much as in any country, attention has been paid to the education of school children with regard to the preservation of their teeth. While taking pleasure in reporting a marked improvement in the education of the public in general, and while this wholesome condition is noticed, the dentist should not forget that there is much more for him to do; there are still multitudes on multitudes who need education from the dentist. The distribution of small pamphlets relating to the care of the mouth and the teeth has resulted in much benefit to the reading classes.

Intimately kindred to the subject of dental education, and appropriately here considered, may be some of the recent discussions and developments relating to the standing of the dental profession among and as one of the learned professions. During the past year acrid controversies have been participated in by prominent members of the profession, occupying both sides of the question, and while numerous proofs are cited by dentists who are or are not members of the medical profession, important action has been taken by the representative body of medical men in this country in the following resolution adopted by the American Medical Association at its meeting held in June last:

Resolved, That the regular graduates of such dental and oral schools and colleges as require of their students a standard of preliminary or general education and a term of professional study equal to the best class of the medical colleges of this country, and embrace in their curriculum all the fundamental branches of medicine, differing chiefly by substituting practical and clinical instruction in dental and oral medicine and surgery in place of practical and clinical instruction in general medicine and surgery, be recognized as members of the regular profession of medicine, and eligible to membership in this association on the same conditions and subject to the same regulations as other members.

Whether we as dentists agree with the spirit of that resolution or not, no one will venture to gainsay that a recognition of that character is worthy and elevating. While as a profession embracing dentistry and composed of dentists we may be proud of the position occupied, we entertain the belief that dentistry with the most perfect system of education can never rise to the rank of a profound cardinal profession, unless it does so as a branch of or specialty in law, divinity, or medicine. Dentistry, limited and confined as it is to but a circumscribed portion of the human anatomy (an important portion, it is true), in importance will nevertheless be ranked so low in the scale that those giving their life and time to its work can never be classed among the great professions. The changes and alterations in our methods of practice, taking place simultaneously

with the education of the dentist, will eventually so alter the principles and practice of dentistry that those now living who could then observe the change would readily admit that there are but three professions, and that dentistry is an important branch of one of them.

Dentistry has certainly received much consideration of late at the hands of assemblies and bodies of learned scientists and physicians. Sections have been set aside for the consideration of oral and dental surgery in many of them. This is true of one of the most highly honored of German national societies, as well as of the American Medical Association in our own country, and the International Medical Congress so soon to meet, and to whose success every lover of his profession should richly contribute.

Part II.—Dental Literature.

While possibly among dentists literary tastes do not prevail to as marked a degree as among members of other professions, the progress of literature during the past year has been as favorable as during former years. In a profession whose advancements and improvements are almost of daily occurrence, in order to secure the best results the most favorable means are promoted by the current and periodical literature of the profession, and in that field several important additions have been made during the past year.

To the four journals hitherto published in the French language, an addition has been made by the appearance of the *Revue et Archives Suisses d'Odontologie*, at Geneva, Switzerland; while the six German publications have been reinforced by the addition of one. In the United States during the past year the *Dental Review* and *Western Dental Journal* have made their appearance.

Relating to text-books, the following from the transactions of the last meeting of the National Association of Dental Faculties may be quoted:

"Text-books are needed on the following subjects: Oral surgery; dental pathology and therapeutics; operative dentistry and orthodontia; dental chemistry and metallurgy; dental prosthesis. Books on other subjects seem to be very well provided for at present. The report recommends that committees be appointed to solicit the writing of such books and to examine the manuscript, and if found acceptable to authorize their publication as text-books on these subjects, with the indorsement of this association; that the publication of the various books shall be under the supervision of committees

composed of the professors in the colleges of this association of the particular branch of study to which the book is devoted, or such persons as the faculties may select; that the committee shall have power to solicit writers for the subjects named, and to require the books to be written upon a plan acceptable to the committee, and that the final copy be submitted to every member of the committee, and unless it receives the approval of at least three-fourths of the whole committee it shall not be considered approved; that each writer shall be expected to retain the complete ownership of his manuscript and to publish it at his own expense and risk."

Several important additions have been made to our literature during the past year. Of those not hitherto mentioned in reports to this association, the following may be here referred to as the most important works:

Trouessart's "Microbes, Ferments, and Molds." "Within the covers of this unpretentious volume will be found a vast amount of practical and useful information relating to parasitic fungi and molds, ferments and artificial fermentation, microbes of the diseases in man and animals, culture of bacteria, terminology, laboratory research, etc."*

Richardson's "Mechanical Dentistry." "Since the first edition was issued, now twenty-six years ago, Richardson's 'Mechanical Dentistry' has been the standard text-book both for the student and practitioner. The fourth edition, recently issued, is yet more deserving of commendation, and fully maintains the reputation in which the work has been held. It presents a faithful picture of modern prosthetic dentistry, the newest as well as the orthodox, time-proved methods and appliances being plainly described in excellent text and in well-executed illustrations.

"The author indicates his appreciation of the fact that there is a growing sentiment in favor of bridge-work by devoting seventy-two pages to the subject; he also doubtless ministers to a popular want in giving even more space to the chapter on root-crowning. The subject of bridge-work is treated in a fair and unprejudiced manner, the methods employed by different practitioners being described in detail, in some instances in the very words of the inventors."*

Parreidt's "Compendium der Zahnheilkunde." "This little handbook of dentistry is, in its sphere, one of the best ever issued from the press. The volume is intended for the student and physician. Careful reading of it will enable either to obtain a good general fund of information relating to the rudiments of dental science.

* *Dental Review*, Vol. I.

"The work is divided into six chapters, treating of dental anatomy and physiology, anomalies, erosion, and caries; diseases of the pulp, the periosteum, alveolar processes, maxillæ, and the mucous membrane; of filling, extraction, and also dental prosthesis; thus comprising the general field of dentistry."*

The work has been translated into English, with annotations, by Dr. G. V. Black. It is to be published in October.

Ostrom's "Epithelioma of the Mouth." "To the busy practitioner this little volume, by reason of its brevity, may prove very useful, because the dentist should at least be able to recognize this grave condition when it occurs in the mouth."*

"The American System of Dentistry," edited by Wilbur F. Litch. Two volumes have appeared. "The work when completed will be a comprehensive presentation of the whole subject of dentistry, and until the last volume is issued a just review of the work would be impossible. We are, however, content to believe from the learning and character of those engaged in the work that the undertaking will be successful, and that it will be for a long time to come the standard work of reference of this kind in the world."†

Stowell's "Microscopic Structure of a Human Tooth," etc. "This is a handsome work in the style of illustrated art publications, of portfolio dimensions. It is printed on fine, heavy paper, and the plates, of which there are twelve, are mounted on muslin guards. The illustrations are well executed, and on a scale sufficiently large to make the delineation of structural characteristics very distinct. The illustrations were all drawn in India-ink by the author, and reproduced by the engraver in such a manner that the former holds himself responsible for their accuracy. Appended is a condensed historical résumé of the progress of dental microscopy, followed by a description of the microscopic structure of a human tooth, including the dentine, dentinal canals, dentinal sheath, dentinal fibers, the granular layer, the interglobular substance, vaso-dentine, osteodentine, and dentine of repair; cuticula, enamel, cement, pulp, odontoblasts, and lymphatics; with directions as to methods of examining. The professional style, tone, and character of the work is to be highly commended, and whether the opinions held by the author are accepted or not, it cannot but prove useful to the student of histology."‡

* *Dental Review*, Vol. I.

† *Western Dental Journal*, Vol. I.

‡ *Dental Cosmos*, Vol. XXIX.

Tomes's "System of Dental Surgery." "A large part of the work is devoted to oral surgery, as distinct from the description of ordinary operations which constitute the great bulk of the work of the average dentist. This subject is ably and exhaustively treated, furnishing the specialist in this department of dentistry with a practical and authoritative guide. The amount of labor and of comprehensive brain-power required for the treatment of each and all the subjects embraced in this system is enormous, and that it is so well done by a single mind is remarkable. But a right appreciation of the requirements of a rapidly-developing profession demands rigid and impartial criticism of a work which, making no pretension to completeness, is yet the book by which the present condition of dentistry will be judged. The growth of dentistry during the fourteen years which have elapsed since the last edition was given us, by the younger Tomes, has rendered necessary much revision and alteration. Some sections are omitted and other new ones added. There are thirty pages of matter and twenty-nine illustrations added to the new edition. The pages and type are larger, making a book handsomer and more easily read. Terms have been in some degree changed to conform to present good usage, but the words 'fang' for 'root,' 'nerve' for 'pulp,' and 'dead' for 'pulpless,' still mar the pages and dismay those who are striving to secure the adoption of an improved nomenclature."*

Ingersoll's "Dental Science." "Dr. Ingersoll's work is designed for the student, and the three chapters of which it consists are a compendium of the lectures delivered by him in the dental department of the State University of Iowa. The blank pages facing each printed page 'serve for taking notes of reading or of information derived from other sources, on the same subject as are made points of inquiry on the page opposite. Thus the work becomes a handbook of ready reference for the office.' Taking the volume as a whole, it is very practical and useful, not only to the student, but the practitioner as well, both by virtue of its contents and the opportunity offered of recording observations and making notes for ready reference."*

Taft's "Index to the Periodical Literature of Dental Science and Art." "A careful examination of the above Index will reveal to the student a mass of information which cannot be found elsewhere without great labor and a loss of much valuable time. While it is incomplete in many respects, it is of undoubted value to every dentist

* *Dental Review*, Vol. I.

who may wish to know where to find particular papers on the subjects which have been written upon by various writers." *

"Management of Pulpless Teeth." "The purpose of its publication is shown in the modest and brief preface: 'The Odontological Society of Chicago, realizing the want of some hand-book of reference relating to the treatment of pulpless teeth that are to remain in the jaws, sends out this monograph with the hope that it may prove of service to the profession. It purposes to detail a simple but comprehensive system of treatment, without attempting to present the various other meritorious methods which have been from time to time advocated.' The topics concerning the proceedings indicated by the title are discussed in ten chapters, and the appendix of six very brief chapters treats of broaches, bleaching teeth, antiseptics, disinfectants, etc." †

In view of the darkness in which the histology of the periosteum has been hitherto enshrouded, a work entitled "A Study of the Histological Characters of the Periosteum and Peridental Membrane," by Prof. Black, which has just issued from the press, will be highly welcomed.

Numerous other works of minor importance have appeared during the year, and dental literature in the main has kept pace with the advance made in all of the arts and sciences.

Part III.—Dental Nomenclature.

On this highly important subject the Section reports but one paper as the work of the past year. To our knowledge, not a single article has appeared on the subject anywhere in our literature during that time. We do not believe that any comprehensive report on this subject can be made until it has been considered by an international dental congress. A committee was appointed by this Association in 1885, and instructed to report in 1886, on the "feasibility of this Association's calling an international dental congress, to meet in conjunction with this Association in 1887." That committee having failed to report last year, and no such congress being convened this year, we cannot refrain from seriously recommending the formation of such a dental congress. This Section has an unusual interest in that matter. Of that branch relating to nomenclature we can only vaguely theorize, while we are totally unable

* *Dental Review*, Vol. I.

† *Dental Cosmos*, Vol. XXIX.

to render any proper report on the subject until it has been treated as it should be by international action.

There is no definite nomenclature which is understood all over the world, and consequently there are many misunderstandings among writers of various nations, or even the same nation. Our systems of terminology and notation are simply abominable. There are no rules governing the phraseology of diseases; there is no universal system of giving the anatomical description of the surfaces of the teeth. In the present state of affairs, it is almost impossible to describe certain conditions in a sufficiently lucid anatomico-physiological manner, so that on the mind of every hearer the same ideas would be impressed. Thus, for instance: The difference of diagnosis between "pulpitis partialis" and "pulpitis partialis purulenta" may not be marked, yet the course of treatment to be adopted may vary considerably. Another example: There may be mentioned the difference existing between "periodontitis acuta apicalis" and "periodontitis acuta diffusa," and numerous other diseased conditions, which are described by others in various terms, while aiming to convey the same idea. A system of universal notation is very desirable. The chaotic confusion now existing in this field of our inquiry is indeed lamentable, and the Section sincerely hopes that steps will be taken to arrive at some satisfactory solution of this vexed question.

In conclusion, Mr. President, Section II begs leave to suggest as one of the essential means to advance the interests of the education of dentists and of dental science in general, that an international dental congress be convened at an early day, and that this association take preliminary steps toward the consummation of that object. In an organization of that character many of the vexed questions relating to dental education or nomenclature, literature, and science could receive proper consideration, the profession from all parts of the civilized world be brought into communion, and the results emanating therefrom would eliminate numerous errors, simplify many clouded theories, and raise the standard of the dental profession to a position for which all whose lives are devoted to its interests do so devoutly pray.

SECTION II.—Continued.

Nomenclature.

Paper by W. H. ATKINSON, Chairman of the Section.

NOMEN, a name, and *calare* (*kalein*,) to call; literally, the names by which things are called and classified. Things, then, are the subjects of names. Things are *thinks;* that is the middle stage of mental activity, between deficiency and fullness of the mental apparatus: therefore transitory, incomplete stage of knowledge, which is fullness or completed mental gestation. The first work of the nomenclator (caller of names) is classification.

1. { *a.* Ideal (unpronounced individual.)
   { *b.* Real (pronounced individual.)
2. Real bodies are embodiment of *ideal* or typal bodies; the taking on of which constitutes the processes of conception, gestation, and formation, according to plan.

Inception of type proceeds upon a seven-fold plan of ideal and real bodies in duplicates of unpronounced and pronounced conceivable and perceptible forms, from the atom, molecule, granule, and corpuscle, as elements of tissues, organs, and systems in which radiance takes up its abode as individual consciousness.

The manner of this storing of radiance was presented to this body at a former meeting, at which the darkness was so dense as to discourage further pursuit of the intricate manner of the production of protoplasm.

Protoplasm has the ideal and real aspects common to all metabolic masses, the changes of form in which constitute what we recognize as metamorphosis. *Meta*, change, and *morphe*, form; metamorphosis, change of form through which protoplasm is thrown in the metabolism of growth and nutrition.

Meta, Greek prefix after, behind, between, beyond, over, reversely

with, *bainein*, to pass, and *ballein*, to throw, are the roots whence we derive our English words, metabolic and metabolism.

The unseen and ideal type of form and power, then, is the efficient lay-out and antecedent of constructive, nutrient, destructive, and reconstructive change of prime elements in body and process.

Protos, first, and *plasma*, mold, therefore first mold or form of mass from which protista, protophyta, and protozoa take their rise. All these words beginning with proto are supposed to be first of their kind, and when legitimately used stand at the head of their class.

Haeckel made a misuse of this term (protista) as one indicating bodies between vegetable and animal forms, including the fungi, amœbæ, and the like almost diffluent bodies. This fact is one showing the want of a new deal in nomenclature, to enable us to clearly record the bodies we cognize, and the changes through which they are passed in production, construction, growth, exercise, decadence, and dissolution.

The massiveness of the recorded observations of investigators is the great obstacle to advancement in a sound and efficient recapitulation of the work already done as foundation for the deeper and more demonstrative notation in a short, understandable syllabus of certainty of statement.

The great step is to discard the accepted standard division into *inorganic* and *organic*, which has crippled us thus far in our efforts to grasp the origin and career of things.

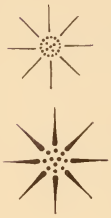
I venture now to again present the formula of the procession of radiance in producing functioning bodies; without a knowledge of which we shall remain without adequate nomenclature to reveal function or factor of function to sensuous perception:

1.
   a. Mathematic point; unpronounced atom.
   b. Atom; least pronounced form of matter.
2.
   a. A group of points; a flock of unpronounced atoms.
   b. A flock of heavier, of coarser atoms; granule.
3.
   a. A nucleated, pivoted flock of light atoms; unpronounced corpuscle; ghost-like.
   b. Pivoted, nucleated flock of heavy atoms; a pronounced corpuscle; body-like.
4.
   a. Light filamentous corona around a vacuole; unrevealed central atom.
   b. Heavy beamy corona about a vacuole; revealed central point.

5.

a. Light filamentous radiance, bearing unpronounced atom.

b. Heavy filamentous radiance, bearing pronounced atom.

6. 

a. Plus filamentous radiancy; granule with beamy corona.

b. Plus beamy radiancy; granule with heavy corona.

7.

a. Filamentous radiance,—bearing corpuscle.

b. Beamy radiance,—bearing corpuscle.

With this plan of nomenclature as a guide, the feasibility of an absolute start at the beginning, and positive, regular progression to finalities with mathematic precision, is rendered certain. A want of thorough comprehension of the idea of positive, serial, sectional, periodical nominations, step by step, gives rise to the indefinite, changeable nomenclature we labor under to-day.

SECTION II.—Continued.

Paper by J. N. CROUSE, of the Section.

"Man's best wealth ought to be himself."

HOW to develop this wealth is the problem of the thinking mind of to-day. By a large proportion of the world education is understood to be the accumulation of knowledge, whether useful or not. The process of acquiring this strengthens the memory and disciplines the mind. According to the systems that have been and are still in general use, it is preparing the student to stand his examinations. When he has fulfilled the requirements as to time, and answered a certain per cent. of the questions, he receives in testimony thereof his diploma. Now he is ready to enter upon his life's occupation; or, if he is the son of wealthy parents, he comes out as an ornament to society, a sort of flower of the family, a seal ring, as it were, on the hand of labor: unless, perchance, he has acquired habits of debauchery and immorality so great as to make him unfit for polished (?) society. This is what might be called fashionable education,—to give the young man a reputation for scholarship but not to educate him. In a large majority of cases what he studies in college he applies to no practical purpose whatever. If we inquire what is the real motive for giving him a classical education, we find it is simply conforming to traditional public opinion. Is it not a common thing to find a college-bred man unable to compete with self-trained artisans from the shop and the street? Why is this? Let us turn to efforts made in another direction to help the feeble-minded and weaklings of the race, and see if we can find a solution for the problem.

In order to counteract vicious and violent habits in imbecile and otherwise defective children, innocent and definite occupations were given to their hands. Attention was soon called to the fact that their minds were also strengthened by this employment. The results were so favorable that there sprang up object schools, sewing schools, carpentering schools, and other like attempts to train the brain by means of the hands as well as the eyes.

These efforts soon resolved themselves into orderly, systematized work, the object of which was to train children in the elements of manual skill rather than the technical details of special trades. The aim was the acquiring of *precision, accuracy, industry, and concentration*, which should result in original and thorough work, be it of brain or hands, until now it is an acknowledged law of psychology that thought is made clearer and more definite in the mind by every expression that it gives itself in the outside world, whether in clay, wood, iron, or words.

To illustrate: each of you has experienced the added strength your thought has gained when you have explained it in words to some listening friend; so does added clearness come to the child's thought when he has expressed it in clay or sticks; to the boy's thought when he has sawed it out in wood or hammered it out in iron. No mental haziness or insufficiency can then remain unnoticed. The very effort at expression brings concentration and leads to sharper observation. This induces clearer thinking. Are not pictures and statues thoughts expressed in material form?

With this truth in mind, Frœbel planned and organized his wonderful system of kindergarten for little children, wherein head and heart are trained by applying the hands to constant work in useful and beautiful forms, progressing from the very simple to the more complex as the child's skill increases.

Estimate for yourselves the added self-reliance, original thought, and unbiased judgment which come to the child who is given a simple design to build in blocks or fold with paper, and then allowed to change it to a new form, created by his inborn power of imagination, over and above that which comes to the tired urchin cramming the words of some book-making pedagogue in which no part of his *real self* is aroused. To the former child placed in this miniature world truth is true, not because somebody has said it was so, but because he himself has come in contact with real things—has tested and proved them for himself. Has he not learned from experience that a whole is always greater than its half, that a block must be evenly balanced if it is to stand firmly upon another, and other laws of mathematics and physics? From like evidence has he not found that justice to each is the best for all, that unselfishness is far sweeter than selfishness, and similar truths in moral philosophy? In this community of equals his God-given faculty of investigation is trained to construct rather than destroy; his whims, caprices, and passions are taught to submit themselves to law,—self-

imposed law. The good-will towards another like worker, so needed in after life, is inculcated. All are at work and all rejoice in the success of each finished piece of work, until that much-to-be-desired aim is accomplished,—the subordination of the individual interest to the general good.

So beneficial has this system of training proved itself to be that manual training-schools have sprung up in all our great cities and centers of civilization. To go into a detailed account of this more advanced method of educating head and hand together, rather than the head alone, would be out of place here. The agitation in the school world around us to-day is the effort to change from mere book-knowledge to a training of the faculties, and it bids fair to revolutionize the whole plan of education.

Without, perhaps, realizing the educational benefit of it, *our dental colleges have been carrying forward this double education of head and hand*, which will account for their more rapid and thorough advancement than other professional schools.

For the same reason as in child training, if the student has had manual training before entering the professional school, or if he has ambition enough to continue his mental training after his graduation, the manual skill and accuracy required in his practice will be a very great advantage to him in his studies.

Think for a moment of the advantage it would have been to each member here if he could have had such training in childhood and youth; or, if we are as large in our own estimation as we possibly could be under any circumstances, imagine, if you can, the advantages to the future dental student.

This seemed to be a fitting occasion on which to call attention to the dignity and utility of manual work. Let us have more of it, and an increasing improvement through it.

DISCUSSION.

Dr. Atkinson: I must say a few words in the way of suggesting the great need we have of just the work laid before us to-day. When we have so many teachers engaged in schools of learning who have nothing to say upon this subject, it is not because they do not know of the need, but that they have none to lead them in portraying their mental states with sufficient definiteness so that the words shall mean the same thing in all relations. The subject is too great to be referred to even in a syllabic manner in a single speech, and if we are to get alphabetical statements they must

necessarily seem somewhat disjointed and disconnected. In science, as in religion, when an individual attains an advancement, it so warms him as to make him feel that he wished all his friends had made the same accession, and the antecedent mistake of dividing religion and intellection has got us into the pother that we have so many alphabets, so many lay means of endeavoring to present our mental labor.

The review of Dr. Ottofy is a labored one, for which I render him my hearty personal thanks. It is not a very easy place for one to occupy to be everlastingly finding fault with what other people do, however brilliant the illumination may be, however clear the vision that such is the only step to be taken. Now, if we could grasp the point to do the thing next to us by the first impact of indication that finds pronouncement within the range of our own consciousness, and know that that was the divine lead, we would have made a great advance. The sober second thought is of Satan always. People say, do not go off half-cocked. Would to God they would go off quarter-cocked, if that were the first snap that they have to make, and walk in the light as they have the light, and then we would get so as to see eye to eye about what we are talking.

I am led in the range of my own mental perception to take cognizance of the difference between the investigations of naturalists, and especially those leaning toward the healing art, of now, and then when I was first studying to prepare myself to practice the healing art. We did know something about cleanliness, and it was told us that it was next to godliness; but they failed to tell us what godliness was in such definite terms as to enable us to practice it at each moment. If they had not spelt it with one *o*, I believe they would have made better progress; because spelling it with one *o* makes it so transcendentally out of the reach of our mental grasp that we forget it means goodness. Put the two *o*'s in and we will get along better. The brilliant minds of the present age are receiving such a churning as has never been recorded, in the endeavor to get at the physiological chemistry of the simplest bodies of which we can take cognizance by the amplification of the best powers of the microscope that have yet been made. Every time any individual or party has been poisoned by the retrogressive change in canned meats, roast goose, ice cream, or any of those things, the medical men who were bound by past instructions sought for some mineral salt that they knew was poisonous to the animal body, and did not catch the idea that it was possible to have a retrogressive movement in the

chemistry of the food which should produce an alkaloidal body that had this power, or was a concomitant of this power that is called poisonous. We are beginning to understand that, with the hope that we shall get at the foundation, so as to recognize the first possible form of a body that is endowed with the power, or has the capacity to receive the power, under the impact energy, that may produce a change in what is called a healthy bone, or shall be destructive in that construction, and thus initiate the retrogressive metamorphosis that produces destructive effects. All impact of power must take one of three courses: combine according to the law of type on the antigrade movement and effect the object or purpose; be arrested in that, or take the downward movement of the steps in succession. When we shall have caught what has already been pronounced in the minds of some of the best investigators, we will be able to begin to understand the changes that we so heedlessly undertake to control when we attempt to administer as we say to our patients, "This is good for what ails you; take it and you will get well." That is the science (?) that we have had from the highest medical men until the era that introduced that physiological chemistry which we must now learn or remain groping in the dark.

Dr. Abbott: In the very exhaustive and most admirable paper read by the secretary of Section II, mention is made of the German system of teaching dentistry in a manner that would indicate to a casual listener that it was superior to that of this country. And the opinions are based upon the fact that the government has control of the schools and universities. I wish to take exception to this. In my opinion, government control of schools, particularly professional or scientific, is in a measure a hindrance to the accomplishment of the best work of which they might be capable. Dental schools are perhaps as good an example for illustrating the point as any. They being under control of the government, teachers are appointed by the government. These teachers or professors select one or a number for assistants, as they may desire, with the understanding that they personally must do the teaching, both didactic and clinical, no *outsider* being allowed to give clinics or demonstrate in any manner any idea or mode of practice which either coincides with or differs from those entertained or followed by the professor. This seems to me to be limiting the education of men to a rather detrimental degree.

Not long since a man whom you all know, if not personally, certainly by reputation, proposed to the authorities of the University

of Berlin Dental Department to visit their school and give clinical instruction to the students a certain length of time each session, without charge, and he was politely informed that his services were not required and that they could not accept his generous offer. That same gentleman, Mr. President, while on a visit to this country was invited to give clinics before the class at the New York College of Dentistry. The invitation was accepted, and he gave several clinics, to the great satisfaction of the students. Mark the difference. In this country we invite men of standing in practical dentistry from all over the world to come before our classes and demonstrate every new idea—or old one, for that matter—they may have, believing as we do that the education of our students is thereby improved, made better and broader than it would have been had we confined the teaching to one man's ideas.

There is a feature in this country which I have no doubt has a material bearing as regards the education of men for the practice of dental surgery, *i. e.*, the people know more about dentistry, and demand more of dentists in their practice than those of any other country, and until the people of other countries become better informed upon this subject and reach a higher level of appreciation of good dental work we can expect but little improvement in the education of their dental students.

Dr. Winder: Dr. Atkinson is right when he says that the subject of nomenclature is a difficult question to deal with. Our profession and the scientific world generally need a better nomenclature, but it is a very difficult matter to so arrange one that whatever term may be used will express to the intelligent mind the idea it is intended to convey; in other words, so that the name selected shall convey within itself an accurate definition of the thing so called. This is what is desired, in some form or other, to be agreed upon by the workers in science. Many gentlemen, in their descriptions of diseased tissue (that is what pathology means), purposely avoid technical terms used by others. Histologists do the same thing, and in this way the different authors are confusing to the most discriminating mind. To reduce this chaos to order and bring this matter of nomenclature up to the desired standard is surely a very difficult problem.

What Dr. Abbott has said, I heartily indorse, and yet there has been a disposition on the part of our own profession to cater to the European dental educational system. We all know that the object of these laws in Europe is simply to keep American

dentistry out of Europe, and yet some of our best men in the profession have been led off, and want the dental schools of America to change their system, so as to come up to the standard, so called, of European education. This is exactly what we do not want. We do not want to teach as they teach. We do not want to turn out the dentists that they turn out. We know that we are making better and more competent ones. And if we were disposed to cater to the European sentiment, we should gain nothing by it. If the American colleges were to-day to agree to do this, that, and the other, to please and satisfy the native profession of Europe, in order to get recognition for our college degrees (that is the term used), they would stick a stake somewhere else, so that we could not get there. They do not want American dentistry doing better work to despoil them of the money which they think of right belongs to them. This is the true animus of the profession in Europe wherever American dentistry has been legislated against.

Dr. Guilford: I would like to compliment Dr. Ottofy on the very excellent report he gave us to-night. It is not only very excellent but also exhaustive, so exhaustive that I scarcely know what more can be said upon the subject. One of the papers read by the other gentlemen of the Section began at the very foundation of education and the other passed quite above our heads. While the language in the paper of Dr. Atkinson might be comprehensible to him, and while the ideas in his mind were probably clear to himself, I do not believe he succeeded in making them entirely clear to others.

In regard to the paper of Dr. Crouse, it seems to me that while some things that he said were very true it is a paper hardly suitable to be brought into this body. To my mind it was extremely elementary. I do not believe Dr. Crouse did himself justice. It seemed to me like a paper prepared for some convention of teachers, and read before such a gathering it would have been well enough, but I do not consider it a paper to be brought before any professional and scientific body. In that paper he said some things which were certainly very new, among others, that education consisted in imparting to a man a certain amount of knowledge. I did not know that before. It seems to me the word has been improperly named by calling it education, if he is correct. I thought education consisted in bringing out what was in a man, not in putting something else in him. And then he said that the teaching of to-day in the schools (I don't know whether he meant in dental colleges or schools

in general) consisted in preparing the child or individual to answer correctly a certain fixed set of questions, and after that was done he was presented with a sheet of paper called a diploma as a testimonial of his proficiency. I think he entirely undervalues what is known as education when he speaks of it in that way. He also spoke about cultivating the hand-craft of the individual. We want in every case to give them as liberal an education as we are capable of, and in so doing we do not believe we interfere with that hand-craft, but rather give them the means or power which will enable them to make better mechanics. In reference to this matter of education, I know from my own experience that in nearly all cases the most satisfactory students in dental colleges are those who have received a liberal education, and most generally those who have had the advantage of a collegiate course. Where a man has been liberally educated, where his mind has been trained, he is capable of taking hold of and grasping a subject much more readily than one who has not had the same opportunity, and being able to do that he will overcome difficulties that present themselves more quickly than another. With reference to this matter of manual training, I do not believe we need it, except in special cases. The individual who has within him a certain amount of mechanical ability will have that developed if the proper conditions surround him. If he is born a mechanic and any opportunity is given him to develop, he will prove what there is in him. One man is not a worse mechanic for having had a college education, nor is the ignorant man any the better in regard to mechanics for not having had educational advantages. I have seen men turned out who possessed wonderful manual dexterity in our art, who have been college-bred men, and again others who have not been so trained.

Dr. Abbott: I am a little surprised at the criticism of the paper just read. I supposed that most of the gentlemen present understood what was being read and the ideas intended to be conveyed. It only shows, Mr. President, how necessary it is for us to become more liberally educated.

Dr. Crouse: I should have been a good deal surprised at the remarks of the gentleman from Philadelphia, had I not had one or two talks with him about the subject before. I say there is no teacher here who has not studied the principles that are inculcated in the best kindergartens who would not be a much better teacher if he would make a study of that system of advanced education. It is advanced education, and I was very much surprised to see how little

it was understood, even among educators in the National Association of Teachers at Chicago, which I attended awhile ago, many of the speakers regarding manual training as intended only to instruct the boys in trades, while its true purpose is to develop the mental and physical faculties at the same time. It is very evident that the speaker has never learned to listen nor to apply his mind directly to the hearing of a paper or he could not have made so many errors in his understanding of what that paper stated. I said distinctly that I did not depreciate the value of a good liberal education, but I was only wishing that the advanced form of education might supersede the older, which was more a process of memorizing and less one of developing what there was in the mind of the child. My child comes home from school and plucks plants on the way and is anxious to learn the names of them and to which family they belong. He brings home pebbles in his pocket, with the tests given by his teacher to find out whether they are granite or limestone, and he goes to work experimenting for himself.

Dr. Guilford: I would like to ask the gentleman if he did not say that taking a classical course was simply conforming to a fashionable custom?

Dr. Crouse: I said there was a fashionable sentiment on the part of the more wealthy concerning the sending of their children to college, and that the process pursued there was one of cramming, so that students studied a great deal that they did not make any use of. I have questioned college graduates many times, and have rarely found one who made use, in after-life, of what was studied in college; but what I was trying to get at was to show that the course of education now being adopted by the more advanced systems teaches children to think, making them better thinkers, so that they do not rely altogether on other men's thoughts, but work out their own and become, as it were, originators of thought rather than the mere memorizers of what they study.

Dr. Taft. One of the chief difficulties in regard to our nomenclature lies in the want of a full and definite knowledge of the thing or things to be named, combined with a want of knowledge of language by which it is named. We have very little difficulty in giving a name to any object with which we are entirely familiar, and about which we know much. These we can name easily and distinctly, so that there can be no mistake by those equally intelligent, and especially where we have a good command of language. I think this would be apparent to every one. The objects that we

know less about we have more difficulty in nominating unmistakably. A knowledge of the objects, with the proper command of that by which we name them, will enable us, in almost every instance, distinctly to name in such a way as to be easily comprehended by others. If we would correct our nomenclature we must become thoroughly acquainted with the objects and acquire a good knowledge of language, that instrumentality by which we name things. One difficulty we have in understanding Dr. Atkinson, for example, is, that we are not well acquainted with the things that he talks about. If we were as well acquainted with the ideas he presents as he is, we would understand his nominations; at least we would have no difficulty in comprehending the names of the things. We might choose another name than that which he uses, but we would have no difficulty in giving a correct name.

A thought or two in reference to this matter of dental education. There are various phases of it. We ought to consider well the beginning of this work that has been adverted to in various ways. Dr. Crouse began at the bottom, perhaps further than he needed to go just here. We are concerned here with that which educates and draws out and develops the powers of those who are to enter into the ranks of our profession, after they have obtained the ordinary elements of education. The profession is much at fault in this particular, that they permit anybody who chooses to do so, whether having any natural fitness or not, to enter upon a course of study. Perhaps there are some exceptions. It seems to me that it is within the power of the profession to at least encourage those who are prepared, or are properly endowed, and to discourage those who are manifestly lacking either in natural or acquired ability. Many times a young man is taken into an office to do the menial work, and by and by he conceives the idea of studying dentistry, without either acquired or natural ability or disposition for it, and no word of discouragement is ever spoken to him, and he is allowed to go his own way, and in a little while he is in a dental college.

There is another point. We talk about educating the student. Who is the student? Is a man a student the first two or three years only, and is he not a student afterward? If so, it would be better that he had never been a student at all. The man should be a student all the way through his professional life, and he ought to be made to understand this from the beginning. How many of our young men enter college with the idea that they will go two or three years and thus will learn dentistry? How many of them carry

this out in practice? They simply come up to a certain point, and from that point there is a retrograde movement. We have very many men in the profession who have not had in their early training the advantages they should have had, and is there no means of helping these men? I oftentimes put this question to men who I knew were deficient: "Would you not like to have some further assistance? Would you not like to have the opportunity of improving yourself in many points that you know you are weak in?" And many times they have expressed a request or desire to have such an opportunity. But our colleges are arranged and the work is provided for the beginner. It is elementary in the outstart, and goes on with the student through a certain grade or scheme that is not adapted to advanced students. Would it not be well if preparation could be made in our colleges for such advanced work, that men who have been in practice five or ten years, or longer, might have the means provided by which they could come and receive the instruction adapted to their advanced position, for a few months or longer, if they could spare the time? Occasionally you would find men who would avail themselves of such a system, if it were inaugurated.

What shall I say about the teachers? How many of us make teaching the work of our life? With how many of us is it a secondary consideration? Our practice is the great thing. It would be better if men could be devoted to this work and spend their lives in it, giving their whole energy to teaching those things for which they are qualified. This would be far better for teachers and for the profession as a whole, and it certainly would be far better for the public. I do not see the way open for this, but is it not worth thinking about? Cannot endowments be obtained by which professorships could be established, and this man and that man be set apart for this work, so that they would be satisfied and devote their whole lives to the work of teaching? How is it now? We give students the crumbs which we gather up in the ordinary way of practice. We do not prepare for them a rich feast as we would if our whole time and energy were bent in that direction. This is a matter well worthy of our thought.

Dr. Butler: In the compilation presented by Dr. Ottofy he gives the correspondence with different colleges, in which, notwithstanding the acknowledged propriety of the step or the desire of most of them to advance the term from five or six to nine months, they bring in quite a number of excuses why it is not done in fact. That is in

keeping with the announcements that are sent out by the different colleges setting forth that such and such chairs are filled by certain gentlemen nominated as professors, when frequently some of those professors never give a lecture. Students making application to these institutions are required to matriculate and pay certain fees as their part of the contract. That is all right. If I purchase a certain number of acres of land, as specified in the deed, unless I find that amount of land on examination the contract is not valid. I claim that if colleges make announcements and the students come forward and pay their fees, they are entitled to the fulfillment of the contract on the part of the institution in accordance with the announcements. The students accept the terms, whether it be for three, four, or nine months. The colleges do not make any rebate on the fees if one-fourth of the lectures are remitted for any pretext or reason. I ask if that is a fair contract?

Dr. Abbott has stated that it might be inferred from Dr. Ottofy's report that the course of instruction in Germany was more complete than in this country, which he seemed to question. So far as the dental and medical students in the universities are concerned, there may be a question, but there is no question in regard to the thoroughness and the completeness of instructions which are given in the private hospitals of Germany, France, and England. You are required in Germany, if you enter the private hospitals, to sign a certain contract, and only so many are admitted to the clinic room at one time for the study of any of the specialties in medicine and surgery. You are to be there promptly at the hour, clothed in a certain manner, and conduct yourself in a certain manner. That is an iron-clad rule, and the contract is thoroughly fulfilled. You pay your fees and they teach most thoroughly, more thoroughly than in this country, with all our liberality and with all our ability; and the only way they will ever reform the theory of teaching in the dental department or the science and art of dentistry will be through some such channel as that, to overcome the old regime of France and Germany as well. So that, with all our facilities, which are great, they are not as faithfully used as they ought to be at the present time. The claim is that students cannot afford to give the time, as was stated in the report made by the secretary of the Section. There is not anyone who cannot afford to give the time for preparation to enter the profession, if he is really in earnest, and if he is not in earnest we do not care whether he has the time or not, we do not want him; and those who are acting as teachers ought to

afford to teach faithfully if they attempt it at all. They are doing a great deal of work. That is admitted on all hands, and all the criticism that can possibly be made is that the contracts in all cases are not carried out as they should be. To argue that there are too many schools, or not enough, or that you ought to have more departments, is a question not easily settled. As Professor Taft said last evening, how are certain reforms or advancements to be made? We ought to have endowed chairs. When a man is in that kind of a chair, if he does not do his duty you can put some one else in; but while he is teaching for a little glory, with small compensation otherwise, you cannot very well do that, and that is one reason why the contracts are not carried out more faithfully. There is a great deal of good work being done, but not as much as might be.

Dr. Peirce: The gentleman last upon the floor has evidently not had much to do with dental schools. It is well recognized that the students always have the opportunity for much more instruction than they desire. They think they know what they need, if we are to judge from three-fourths of the letters received. These are to this effect,—"in how short a time is it possible for me to get through your school"—not how much do I need to learn, but in how short a time will you grant me a degree. We lecture nine months in the year and at the close of the summer session it is to almost empty benches.

I want to compliment the secretary of the Section on Education for his detailed report. It is certainly the most admirable one that has been presented from that Section. The painstaking care he exercised in getting information and arranging it is very commendable, and deserves the greatest praise. A word with reference to the paper on primary education. It struck me that the purpose of the paper was a little misunderstood. I think that those of you who are familiar with the system of manual training to which allusion was made will see the great advantage that will accrue from it when the young are educated in methods which tend to accuracy. I was interested in the paper for the reason that I have been concerned in starting a school of the kind in Philadelphia, in which we have had students who were incorrigible in other schools. These same unruly boys became tractable and industrious upon being instructed in the use of molding material, carpenter tools, free-hand drawing, etc., and so much interested did they become in these methods of study that the severest punishment was to deprive them of some one of these lessons. Now, the application this has to dentistry

as well as to other industries is that those who are instructed in these methods of hand-craft and precision will be more apt and successful, not only as students, but as followers of any industrial pursuit. And the sooner this manual training is recognized as an important accessory in the educating of the young, the sooner will society reap the benefit from it.

Dr. Butler: I wish to call Prof. Peirce's attention to a little item of history. I had the honor, or dishonor, whichever it may be called, of filling the first regular chair of clinical dentistry that was ever established in any school, and I think it is safe to say that I filled it acceptably, to the class at least. I only refer to this to show that I am not altogether ignorant of the labors connected with teaching in a dental school.

Dr. Darby: It would seem that the advantages of education, like many other good things of earth, are unequally distributed. We who are teachers see evidences of it every day in our college life. We meet men who would be glad to avail themselves of all the education it would be possible for them to receive. We see other men who want just as little as will be required to pass an examination and obtain their diplomas.

Go into any of our large cities, and you will find, perhaps, in the palace of the rich man a son who has every advantage that money can afford, and every inducement that can be brought to bear to give him an education. He does not desire it; in fact, he spurns it, and will not make an effort to secure it. His ambition in life is to be a horse-jockey or a dude.

In a tenement house hard by is the son of a widowed mother, who is longing for an education, but is too poor to obtain it, and necessity compels him to plod on in work that is distasteful to him and for which he has no special adaptation. Give him the advantages of the other and he might startle the world pleading at the bar or thundering in the forum.

Dentistry, like divinity, is drawing her recruits from the families of the poor, or those in moderate circumstances, rather than from the rich. Many a young man enters a dental college with barely enough money to pay his tuition and his expenses during a course of lectures. He may have lofty aims and ardently desire every advantage attainable, but he must "cut his garment according to his cloth;" and not infrequently students will decide upon a school which has a session of five months' duration rather than one that requires seven or nine, because by so doing they can save two or four months' board.

Facts are stubborn things, and we have to deal with realities. We cannot always do with and for the student what we would; we can only do what we must.

Were I asked what would be my ideal student, I would say, give me a college-bred man fond of his books and also fond of mechanics, or at least with fingers easily trained to work with tools. The two qualities are not often found in the same individual. It is not an uncommon thing to find in our classes men with little education and no special fondness for study exceedingly skillful in the use of instruments, and not infrequently such men do more in the way of saving teeth than others who have been better educated.

It was said last evening that broad culture is a desirable thing, and so it is, but after all it is often the narrow-edged man who makes the greatest success in life; not because he seeks to know but one thing, but because he knows that one thing *well*, and is content to let all else alone. It is a pleasing augury for the future of our profession that each year a greater number of college-bred men are entering our ranks.

What I specially want to emphasize is the willingness on the part of the faculties of our colleges to keep pace with the demands of the profession. I take it for granted that men who enter colleges as teachers do so with the desire of doing just as much good as possible, and if they do conscientious work they find that being professors is not much like play. Some men fancy they would like such positions. It is all pleasant enough to lecture now and then, but the man who delivers two, three, or more lectures each week for five or seven consecutive months finds little novelty in a professor's life. Believing these teachers to be actuated by conscientious motives and working for the best good of the profession, it behooves you to give them as little criticism and as much praise as your hearts will let you make.

Dr. Barrett. I desire to say a few words concerning the subject of nomenclature. We are all of us well aware of the difficulty under which the speaker or the writer frequently labors in endeavoring exactly to express the ideas which he has in his mind, but I am of the opinion that a large proportion of this embarrassment arises, not from the paucity of our language, not from lack of terms, but from their multiplication. We are constantly introducing new terms. We all of us see certain phases of a subject to which we desire to give some special significance and which we wish to be accurately expressed in fitting words. That phase of the subject

exists, perhaps, to ourselves, but has no significance to the mind of another. I might illustrate this by a reference to the author of the paper which we are now discussing. He entertains certain special views,—I say it with all due respect,—with reference to the angelic source of his thoughts and reasonings. To the most of us these angels, in the sense in which he uses the term, have no existence whatever. We have no need for any such term. We consider if an idea comes to us that it has been elaborated from our own inner consciousness; our own conception of that idea is that it is something which is spontaneous within our own mind, and consequently we have no necessity for the use of the term "angels" in the sense in which he uses it. There are many other terms which he uses which have no existence for us. For the expression of the conceptions of his own mind he requires a multitude of terms which are not demanded by the ordinary thinker or writer. This verbiage, which is utterly unnecessary to most of us, to his conception may be an absolute necessity. We cannot judge of his mind by the actions of our own, because it travels in a different line. So I say this employing of numerous expressions for the elucidation of a single idea, occasions very much of the confusion which exists in our nomenclature.

Another thing, we all of us are ambitious to employ words of learned length and thundering sound, and instead of using the terms which we have and which easily and readily express our ideas, introduce new ones, thus constantly changing definitions and producing great confusion. At the present day we have very few "mechanical" dentists. They are all engaged in "prosthetic" dentistry. That is a new term and is unfamiliar to many. We have another term which was used by a speaker last night, "metabolic forces." What is the matter with the good old word digestion? Why can't we use that? It may be necessary for him to call it "metabolism," but to most of us "digestion" expresses the idea properly, and when we talk we should talk so as to be understood. It seems to me that the reform in our nomenclature, if it is to be accomplished and to be anything which shall be of absolute benefit to the average dentist and the average reader, should tend more toward simplicity than toward the multiplication of new, high-sounding terms, and the verbiage which is so extremely common in dental papers.

Dr. W. B. Knapp. The question of a higher or more complete education is one that should interest every member of the dental profession, for upon it depends the elevation and progress of that

profession. Dr. Ottofy has told us where we stand; Dr. Crouse has suggested the beginning of better things, and Dr. Atkinson has shown us what may be attained. The criticism has been passed on the papers of the two last named gentlemen, that one was beneath our dignity and not applicable to us as full-grown men, the other over our heads and beyond our comprehension, and consequently not appropriate for discussion: a strange criticism surely, that a paper is so far in advance of us that we are unable to discuss it understandingly; and if a true one, the proper subject for our consideration should be, *why* are we unable to understand and discuss the more advanced paper? It certainly was logical and scientific. In my opinion, the papers were both eminently pertinent to the question and only need a connecting link to bring them together into one harmonious whole.

Science is the outgrowth of reason; to attain science, the reasoning powers must be developed. A number of teachers in succession failed in conveying to a boy any ideas on the subject of mathematics. The last one was trying to enforce some problem upon his understanding when he interrupted her with "Why?" She said, "If you were going to build a house you would want to know how much it would cost, would you not?" "Yes." "Well, the foundation would cost so much?" "Yes." "The frame-work so much? "Yes." "The plastering so much?" "Yes." "The labor so much —have you the figures all down?" "Yes." "Now, can you tell me what it would cost to build such a house?" "Why, of course I can," and the outcome was Colburn's Arithmetic, which marked a new era in the study of mathematics, because he recognized the inherent "Why" in every student's composition.

It is not enough to deal with students that are ready to enter our offices or colleges. We must commence at the beginning and encourage by every means in our power the production of a class of young men, qualified by their education and training, and especially by their ability to ask and answer the question why, to enter upon the scientific study of our noble profession.

The great trouble with our present system of education is not that the course is too classical or too scientific, but that the system of acquiring it is one of cramming, and that the practical application to every-day life is entirely left out.

Dr. Atkinson: A review of the growth of this body and the local bodies from which it took its origin ought not to be discouraging. Those of us who were at the beginning and have participated in and

enjoyed the growth of the body, and seen the growth of the local means of teaching, certainly in the aggregate ought to be joyous, hilarious, glad, and happy. Whom do I see before me to-day? A set of men who began very low. What carried them up? is the point. Not cast-iron rules of teaching; not set means of obstruction to instruction, for that is what the schools are from beginning to end, outside of mathematics; not the support of the men who are in the chairs, forgetting utterly the divinity of teaching (which is the absolute giving-up by the teacher of his life-work, so that those who come after him may be benefited, by simply and honestly detailing to them the stages of growth in his own mind), but that principle in the desire that makes for righteousness has led us and done the work for us that we said we did ourselves.

It is well enough to have old colleges, but we must not have them so old that they are hoary and defunct; and it is well enough to have new colleges and new local schools and all that, but if they are not inspired with the love of truth and a desire for the uniform progress of the whole, ignoring the advancement of the individual, which we hear in the tone of every man's voice,—that he is for the individual,—we will remain where we are.

How is it that we have progressed? How is it that we have a better nomenclature now? How is it that we have some who ought to be better versed in the history of nominations, so that we should have no confusion? The confusion arises from men who know nothing of the classics attempting to define the classics, and assuming that they are "to the manor born," the "creme de la creme." It is that self-assumption that stands in the way. The highest point in morals is, if you want to save your own soul do not think about it at all, but try to save somebody else's soul. If we wish to have the idea of what shall be the consensus of our own mind respecting the principles upon which we are practicing every day with a cheek that is marvelous when we know so little of the metabolism of digestive activity,—because the ordinary idea of digestion does not cover metabolism, only in a very cursory sense,—we must look deeper than we have.

How many colleges have we now in the United States, and when had we the first one? Do we owe that to any individual? Do we owe it to any set of individuals? Do we not owe it to the inspiration of the necessities that grew outside of our cognition until it was behind us?

What ails the colleges to-day? They have assumed that they

have all the truth nucleated in the damnably small syllabus they have. That is what damns us. It is the assumption that they have the truth. Is that so? Has the baby a long beard when he is first born? Potentially, yes; but there are a great many steps between the practicalization of the embodiment of that idea, so that we can come with a long, two-foot beard, so that we must not consider ourselves as complete in everything, but always keep an open mind for the advanced truth and shed the old effete matter under the press of our necessities, and thus we will grow to love each other because we have a common interest in the truth.

This last college that has been started at the seat of government is to be the tip-top blue blossom. Who are to be the representatives of that? Those of us who know "how that vaulting ambition hath o'erleaped itself," if we are entitled to judge at all of how far a toad can jump by its looks, can form our own opinions. They have three colleges at the seat of government. If they could unite the whole of them they might possibly get one professor fit to sit in a chair. Individual ambition has filled the chairs, in place of those having charge of the institutions seeking the men that are fitted and then putting them there. How are the men fitted? Just as children are fitted to be men by succession of growth. There is a notable example fanning himself, upon whom I can look with joy when I remember his infancy. How did he speak to us last night? They say we do not want personalities. Without personalities your teaching is not good for anything. Let us have personalities. Let us select the agreeable, good things that are in each other, and then we shall be in a good, fine condition when the shower of grace comes, to grow, to blossom, and fruit, and seed, for one of these days we shall have such means of education as shall make the world stand in awe and adoration.

SECTION III.

Operative Dentistry.

Report by E. T. DARBY, Chairman of the Section.

SECTION III, Operative Dentistry, begs leave to submit the following as its annual report:

The Section cannot but present its annual regrets that so few papers have been presented for the Association's consideration; and yet, while the individual members are apparently indifferent, the topics presented by this Section have usually elicited the most interesting and animated discussions. Valuable and interesting as are papers upon strictly scientific subjects, it nevertheless remains true that those Sections which embrace within their scope the practical branches of our professional work elicit the most interest and command the most hearty consideration.

The chairman is aware of the fact that certain of our members are of the opinion that all practical subjects should be discussed in our local societies, and that the American Dental Association is not the place for the presentation of anything but original investigation and scientific research. Lofty as are their aims and commendable as are their desires, we are compelled to descend from the towering heights to which their ambition would carry us, and discuss the everyday, practical things which interest the masses and which from year to year draw them hither. Nor has the Section reason to regret that its subjects are of so much interest; nor would we for a moment seem to depreciate the importance of our place in the Association's worth. As yet science has done little toward the saving of human teeth, and operative dentistry has done much. What is it that has placed the dental profession of America in the vanguard of the world, and made the name of "American dentist" the synonym of all that is excellent in dental practice. Is it be-

cause he is more scientific than his brother in the Old World? No, it is not this; for the Old World has done as much in scientific research as has the New. It is because, and just because, you, gentlemen of the American Dental Association, are practical as well as scientific men, and being such are not ashamed to discuss the practice as well as the theory which enters into the daily routine of your calling. We believe that the American Dental Association is just the place to discuss everything which seems to present merit, or which promises to be useful in helping us to save in the easiest manner possible the teeth of our patients.

The report of a Section is intended to embrace the presentation of papers the subjects of which have a direct bearing upon the Section's name, as well as a consideration of new methods and appliances. An effort was made a year ago to obtain the Association's opinion upon some of the methods which have been in vogue for many years past, but nearly the whole of the time allotted to this Section was consumed in the consideration of the Herbst method of filling teeth. A year has elapsed since then, and those who were enough interested to adopt it wholly or in part have had time to ascertain whether this method of filling teeth has advantages over those in general use. Like many another new thing, it interested because of its newness. Has the experience of those who adopted it been such as to warrant them in continuing its use? The modesty and generous instincts of the man commended him to our esteem and affection, and the versatility of his inventive genius commanded our interest and admiration. Had Dr. Herbst lived in America, instead of Germany, and been familiar with the American methods of practice, it is doubtful whether he would have adopted the one which bears his name in preference to those which are in general use in our own country. Although this method of filling teeth will not be generally adopted in this or any other country, it has nevertheless been of benefit to the profession, for its use required a certain preparation of gold, the introduction of which has stimulated manufacturers of gold foil in America, and the result has been the production of a superior quality of gold for filling teeth. The Wolrab gold of Bremen was the incentive which produced the velvet cylinders of the market, and a better preparation of gold it would be difficult to find.

The attention which has been given of late to the simplifying of operations upon approximal surfaces is worthy of our consideration. The various forms of matrices which have been devised for

the purpose have done much to render difficult operations easy, and reduce greatly the time necessary for their performance. The same may justly be said of the various forms of separators as introduced by Drs. Perry, Parr, Woodward, and Morey. The slow and painful process of separating teeth with rubber and kindred processes may be done away with, and the restoration of contour effected with much less pain to the patient and far greater ease to the operator.

The implantation of teeth, as suggested and practiced by Dr. Younger, of San Francisco, has interested the profession not a little during the year past. Novel as the idea is, and bold as is the practice, it affords another illustration of the accommodating and curative efforts of nature. Whether teeth thus implanted will remain permanent and useful remains to be seen, as time alone can solve the problem. The danger, however, is that absorption of the roots of the implanted teeth will ensue, or that kind nature will rebel against such radical innovations. The subject is worthy of our consideration, and the experience of those who have tried it will be more valuable than theory, and the test of time a better verdict than reasoning. The man who has the boldness to suggest and the courage to practice such advanced theories is worthy of praise. It is only by oft-repeated efforts to compass that which is beyond the reach that great things are accomplished or great ends gained.

It would seem that little remains to be added to our list of mechanical appliances to make operative dentistry complete. The ease and facility with which the dentist of to-day performs operations once considered difficult or impossible is truly wonderful; but unfortunately the progress which has been made is confined to the methods, and are the result of the inventive capacity which is so largely developed in the dental profession.

What we most need at the present time is some reliable plastic material, embracing all of the essential qualities of a filling and requiring for its insertion but a few moments of time. Amalgam, with all its improvements, has been in the hands of most a failure or an unsatisfactory material. The other plastics, while embracing many desirable qualities, have proved but temporary in their character, and therefore they cannot be said to have fulfilled their requirements. That there are in the realm of nature just such materials as would constitute an ideal filling, there cannot be a doubt. Happy the man who discovers in one or combines in many this long-looked-

for plastic. Could this Association make better use of some of its funds than in the employment of chemical talent directed to this end?

Another great need which confronts the dentist daily and almost hourly is a safe and reliable remedy which will obtund the sensitiveness in the dentine. That operations upon vital teeth are painful, and to some excruciating, cannot be gainsaid, and while we have at hand remedies which often mitigate the pain, the safe ones produce but partial or unsatisfactory results. It has been satisfactorily demonstrated that absolute dryness, accomplished by a blast of warm air from a syringe or reservoir of air at a temperature of about 90° F. or 100° F., does as much if not more than anything else yet suggested for this purpose. What is needed is an apparatus so constructed that compressed and warmed air of a given temperature may be conveyed directly to the cavity. At first thought it would seem an easy thing to produce; but repeated experiments have proved that it is next to impossible to convey for any distance heated or warmed air at the temperature desired. Will not the members give this subject their careful consideration? "In a multitude of counsel there is wisdom."

The Section would recommend the presentation by Dr. Morrison of his method of correcting irregularities; also, of a few cases of transplantation and implantation of teeth; also Dr. Watkins's method of correcting irregularity in the anterior teeth.

Dr. Barrett has some interesting cases of irregularity, the details of which he wishes to explain to the Association.

DISCUSSION.

[Dr. Morrison exhibited to the Association several casts illustrating his method of correcting irregularities.]

Dr. Watkins: I have here a cast which I showed to the Section yesterday, a case of a young miss of thirteen, where the six lower front teeth shut entirely outside of the upper ones. The case is one which I exhibited at a clinic for advice in New York, and it created considerable interest. Almost every one there had some advice to give, and many different methods were suggested. After going home I made up my mind I did not know what to do, but thought I had better start and do something. I began by putting in wedges of cotton tape between the upper front teeth in the four spaces between the cuspid and lateral and lateral and central on either side,

and between the centrals, increasing them gradually so as not to get up too much soreness; occasionally waiting two or three days, to allow the teeth to rest. I saw they were moving very nicely without putting any fixture in the mouth, and by this treatment alone I carried the upper teeth entirely outside of the lower ones,—further than was really necessary. I then placed a fixture on the lower jaw, consisting of gold bands around the two sixth-year molars, to which was attached a platinum-iridium bar, running across under the tongue. Rubber ligatures reaching from that to each of the six lower front teeth drew them in as much as they could be. As the lower teeth were drawn back, I cut away my retaining-plate, which I had in the roof of the mouth, so as to allow the upper teeth to fall towards the lower ones as they were gradually moved. That constituted the entire operation, which was completed in one month. It is interesting to me in the fact that I did not use any plate or other fixture to expand the upper jaw or move the teeth, and the work was accomplished with but little pain or inconvenience.

Dr. George W. Keely: I wish to give a word of warning in regard to the injurious effects of the premature extraction of the temporary molars,—I mean their removal before the first permanent molars are erupted and in contact. From my observations during the past twenty years or more, I make this claim without fear of successful contradiction, that, in *every case* where this is done, it will cause a crowded condition of the anterior permanent teeth when erupted.

To illustrate, here is the model of the teeth of a girl aged eleven. When she was about six years old, she came to me with her mother, when I found both of the inferior temporary molars abscessed. With a nerve needle I probed the abscess and let off the pus, giving relief, and informed the mother that the same trouble was liable to occur again, but it could be relieved in the same way, explaining the evil results of the removal of the teeth prior to the eruption of the first permanent molars. Soon after she was taken to their family dentist, who removed them, claiming that no evil could possibly follow. At the age stated, she came to me, when this model was taken. It can be seen here that both first permanent molars came forward and the anterior teeth dropped back; the molars and first bicuspids are in contact, and the second bicuspids are struggling to erupt wholly outside of the arch; the second molars are fully erupted, caused by the extra space given them by the first ones coming forward. The eight anterior teeth dropped back, the cuspids

striking on the anterior portions of the first superior bicuspids. From the cutting edge of the superior centrals to the same of the inferior, measuring on a line back, it is just three-eighths of an inch. In the superior jaw the temporary molars are still in place, and the second molars are just appearing. The temporary molars were removed, and the crowns of the second bicuspids could be seen.

Six months after, I saw the miss again, when I found the second bicuspids and second molars (superior) wholly erupted, and that the second inferior bicuspids, in their effort to erupt, had made a perceptible space between the first molars and first bicuspids. As the posterior molars occluded perfectly, a system of wedging was commenced between the first molars and first bicuspids, to force the anterior teeth forward (as they did not occlude to prevent this) to get space to allow the imprisoned bicuspids to fall into line. When the bicuspids were so far erupted that wedges could not be longer worked, a vulcanite plate was fitted to the superior arch, bearing hard on the bicuspids to expand them. The cusps of the first inferior bicuspids occluded inside those of the superior, and as the latter were gradually expanded, the occlusion pressed out the inferior ones, forcing the anterior teeth forward, and giving ample space for the imprisoned second bicuspids to fall into place. This reduced the space between the anterior teeth, and they now occlude as near normally as is possible under the circumstances, improving enunciation and greatly beautifying the features.

Dr. Barrett: A patient, less than seven years of age, in whose mouth none of the permanent teeth had been erupted fully, the points of the central incisors just barely showing through the gums, by accident had one of the latter knocked out. The case came to me forty-four hours after the accident. Problem: was it possible to re-instate that tooth and secure good results. To understand and comprehend the situation, it is necessary to know that the tooth at that time was in a very incomplete condition as to its root. I have one here that nearly represents it, except that the root is not quite so long as the other, the root itself consisting of a mere shell, there being but very little dentine deposited and the foraminal end completely open. I proceeded in this way: First, I took a piece of very thin platinum, to which I soldered a piece of platinum wire at right angles, that wire being long enough to reach the length of the pulp-canal of the tooth. Filling the root with oxyphosphate of zinc, I thrust that wire up, resting the thin platinum plate on the end of the root, over which it was carefully burnished. There is nothing

original about this. It was impossible to fill it in any other way that I could conceive of, and gold would not answer because the strength of the tooth was insufficient. I obtained with a bit of soft wax as good an impression of that case as I could. Remember the deciduous teeth were exceedingly short, so that it was impossible to obtain a hold on them. When this tooth was re-inserted the problem was, how should I hold it in place? I obtained this cast from the impression, and into it I drilled a hole at the point where the tooth had been extracted, and obtaining from some source a central incisor that as nearly corresponded to the tooth that was knocked out as possible, I inserted it in this hole, and cemented it with plaster. When the tooth was knocked out it was barely through the gum. As the further development of that tooth was to cease, it would be manifestly improper for me to thrust it back to the place from which it came; I must allow it to protrude to the length to which the other tooth would develop, as nearly as my judgment would allow me. I did that, cementing it fast. Now, taking a piece of very thin platinum,—say No. 40, standard gauge,—I burnished a narrow strip of it upon the cast of all the teeth. It was burnished to fit as carefully as it was possible over this tooth which I had inserted in the cast, and then that piece of platinum was strengthened with gold solder. The tooth was then re-inserted in place, all the teeth were wiped off carefully, my stiffened platinum plate was filled with oxyphosphate of zinc, and it was carried to place and held there till the oxyphosphate had begun to set. I was somewhat doubtful of the power of the oxyphosphate of zinc to hold it there, but I was happily disappointed. The child continued to eat upon it, and it was left in position for three weeks. Not thinking to present it here, I took no cast of the case after it was finished, but the child has been presented to a number of dentists, and they could not tell which of the two teeth it was that had been knocked out. I did not encourage the parents in the belief that this was going to be a permanent thing with the child to the extent of the retention of the tooth through life, but I hoped that during the period of development it would be possible to keep the tooth in position, so that the jaw might be properly developed and there might not be a malformation, and the child might not be marred by an appearance which would be the result if the teeth were not left there.

Another case was one of regulation. The patient, a young girl in her fifteenth year, with a peculiar condition of the teeth which

would illustrate some of the evils of premature extraction, although I do not present it for that purpose. There was a projection of the six anterior teeth, with a peculiar elongation of the bicuspids, the first permanent molars having been prematurely extracted, and probably this condition was very largely brought about by the extraction. The six anterior teeth projecting had the appearance of a thumb-sucking case, but there had been nothing of that kind. There was a great deal of embarrassment in speaking, owing to the fact that it was impossible for her to close the aperture of the mouth without thrusting the tongue out. There were two bicuspids and a molar on each side. Problem: to draw the six anterior teeth by the six posterior teeth without danger of moving the latter. If two men of equal strength and equal weight pull upon each other, which will pull the other up? The case required the utmost care. It was done in this way: Bands were fitted around the six posterior teeth as closely and as accurately as it was possible to fit them, and forced on with even more care than I would use in placing a Richmond crown, but they were left open upon the coronal surface. There were some difficulties in the way of the usual methods of procedure; but the bands were fitted to these teeth carefully, impressions were taken, and a plate of gold was laid upon the three gold bands, and each soldered fast. Now, what have I gained by that? By fitting the bands on the teeth so closely and then uniting them immovably, it follows that they must all move together, if at all. These teeth were exceedingly short, so that the bands were narrow, but when I had them all fastened together I could commence the pulling. I anticipated it might be necessary to pull but one tooth at a time. My idea was that I would slip a piece of elastic rubber under the band which passed across the face of the anterior teeth, and then I would produce the pressure on one tooth at a time, and I would change that for another in due time, but it was not necessary. They drew back without any trouble and the case was completed within a very reasonable time.

The point in that is that you can obtain a very firm anchorage so that you can pull three teeth by two, in some cases. It was not necessary to cement this one on at all. It required very little attention on my part. By fitting the bands around the teeth as accurately as you would for any case of a gold crown, and then attaching them together by a gold bar, you have the teeth held so immovably and fixedly that it is impossible for them to tip or move one at a time.

Dr. Morrison: I have one case of implantation to report which

is so far a successful one. It was in place of a left superior first bicuspid. The patient had been under my care since he was a small boy, and at one time I had his teeth under treatment for irregularity, and found great difficulty in expanding the arch. The crown had broken down and the greater part of the root had decayed away (while he was a resident of the mining regions), and the space between the cuspid and second bicuspid was too narrow to admit a proper-sized tooth. So I had to use wooden wedges for a few days. I then extracted the little piece of root, and bored out a socket about half an inch deeper in the jaw, and took an old dry tooth, the only one I could get, possessing the proper size and proportions, among the extracting houses of the city. Such dry teeth go to pieces very readily while trying to remove the root-vessels unless great care is taken with them.

The operation was performed in the early part of the year, and I saw the case a few days ago and it was very firm and the patient is very much pleased with it.

Dr. Crouse: I rise more particularly to emphasize the warning against the extraction of temporary teeth, or cutting them apart in any way that will lessen the space to be occupied by the coming permanent teeth. The extraction of the temporary molar, or of the deciduous teeth anywhere in the mouth, is very likely to interfere somewhat with the space that the next tooth is going to occupy. It certainly is true of the cuspids,—quite as much as of the others. The deciduous cuspid teeth are too often extracted to make room for the lateral incisors. As the lateral incisor comes in sight the mother is alarmed, fearing that there is not enough room, and she goes to her physician or dentist and the deciduous cuspid is extracted. Of course there is then plenty of room for the lateral incisor, but the bicuspid coming next will occupy about all the space, so that when the cuspid comes there is no place for it except outside of the arch, and then that evil has to be remedied. I don't think the question of whether the extraction of the first permanent molar is a great evil or not is entirely settled, and I speak of it with the hope that every practitioner will make casts of such cases as come under his observation, where it seems to be beneficial or otherwise, so that in the course of ten years we may have some positive evidence on the subject.

I have been doing this for ten or twelve years; still I am not satisfied altogether. I have seen a great many cases where it was a great evil, and I have seen cases where it seemed as though it was a benefit, and yet I cannot say what the result might have been

if the teeth had not been extracted. We have had several apparatus described for cases which it is pretty well understood how to treat. I would like to have a description of an appliance for turning teeth in the mouth, where the incisors need turning a very considerable distance. I have no plan in my mind now that suits me. I have tried a great many, and if anyone has a plan I should like to hear it described.

Dr. Harroun: It is often the case that you wish to turn the incisors without moving the teeth out of line. The easiest way I know of is to construct a plate, of rubber or any other material, to perfectly fit the mouth and around the necks of the teeth to be moved, having steel or gold wire attached to the plate, and so bent as to extend around in front of the teeth. When ready to be put in place, trim away the plate at the angle of the tooth to be turned. Now bend the spring as much as you wish and place the plate in position. The spring acting upon the tooth will cause it to turn on its own axis, and it can be brought into position within twenty-four hours. The plate can be worn as a stay-plate until the tooth is firmly set. Another method is to take a silk ligature, double the ends, and form a loop with the uncut or double end. Place it around the tooth, draw it tight, and carry it over and between the tooth and its approximating mate, tying it to a rubber ring which can be drawn back and fastened to a hook or staple in the plate, which must be fitted to retain its place without moving. This method will work well, but must be used with care, as the tooth is often turned too much if your patient does not call at the opportune moment. A good way to construct a stay-plate is to select one or two teeth, (the latter preferably) which can be used to clasp to. Now, take a piece of piano wire, and with hammer and anvil flatten it so that it will slip between these teeth, and bend it to fit nicely, with one end extending into the rubber to be used for the stay-plate. These steel springs are very quickly made and answer the purpose better than gold, as they do not lose their grip.

[Dr. Land made some illustrations upon the board which were not intelligible to the reporter.]

[Dr. Brown asked a question of Dr. Morrison, which was answered by him, but the reporter could hear neither the question nor the answer.]

Dr. H. A. Smith: Dr. Morrison in his remarks referred to a practice that I think deserves a little more attention: It is the removal of a portion of the alveolar process with a fissure-drill or similar instrument by drilling down upon the side of the root in the

direction we wish to move the tooth. Some teeth are so firmly implanted, the cuspids for example, that it seems almost impossible to start them in the desired direction. By burring out the process in this way mechanical resistance is in a measure diminished, and upon the application of force the tooth moves readily. It is not improbable that a pathological condition is set up by this operation and absorption of the alveolar process is thus sooner accomplished than when the usual methods are employed.

Dr. W. B. Knapp: I would like to ask if there is not danger of injuring the pericementum?

Dr. Smith: Yes, I would avoid injuring the pericementum, though no great harm would result if it were encroached upon. Compared with implantation, drilling out a portion of the alveolar process on a line with the root of a tooth to be moved would be mild indeed.

Dr. Abbott: I wish to call your attention to this cast aluminum regulating-plate. Its features of special advantage are (as claimed) the ease with which it is manufactured, its perfect adaptation, its great strength, its extreme lightness, and the great degree of comfort attending its wear in the mouth. In some of its features it seems far preferable to rubber or celluloid. Each regulating case being a *special* one, the mode of retaining it in place, etc., I leave to the operator.

Dr. W. B. Knapp: One of the greatest stumbling-blocks I have met with in regulating is on the part of the parents. My remedy hereafter will be to invariably charge and make them pay in advance at least one-half of what I expect the case to cost. I have started in upon a great many cases of regulating, the patient getting along satisfactorily to himself and to me, until he becomes careless and stays away, or the parents take him off on some little trip, and so the whole benefit is lost. I have one case in mind that I have had under my control over a year. The parent refuses to pay anything for the work that has been accomplished, although I have succeeded perfectly in putting the teeth in the lower jaw in good position, and one-half of the upper jaw is in very fair shape, articulating well with the lower teeth; but on the other side there is still a cuspid tooth projecting so that when she laughs she has to lift her lip and bring it down over the tooth. This spoils the whole thing, and I cannot get further control of the patient, and the parents are disgusted, and what are we going to do? If their pocket-book had been interested to the tune of $100 to commence with, I would not have had the slightest trouble in completing the case.

SECTION IV.

Histology and Microscopy.

Report by FRANK ABBOTT, Chairman of the Section.

SECTION IV finds itself again with very little to report that is new, in microscopy or histology. We would, however, call the attention of the profession to a series of articles from the pens of Drs. Bödecker and Heitzmann, upon "Development of the Teeth," now being published in the *Independent Practitioner*, as worthy of careful perusal. I am personally cognizant of the long and hard work these gentlemen have put upon this production, and although slight errors may appear, on the whole it will be found a trustworthy and most reliable history of the growth of the teeth from their inception to their final completion.

I find myself, Mr. President, the only member of the Section present at this meeting, and consequently we have no papers for the Section, except a short one I have myself prepared.

SECTION IV.—Continued.

Teeth of Rabbits.

Paper by FRANK ABBOTT, Chairman of the Section.

BELIEVING, as I do, that there is often beneficial interest in variety, even in study, I have thought it advisable to vary the papers in my report of the Section on Microscopy and Histology this year by giving a short dissertation upon comparative anatomy of the teeth, choosing the Rodentia as a class and the rabbit as a type of purely vegetable-eating animals for my subject.

The two lower incisors of the rabbit are chisel-shaped formations growing from the lower jaw-bone, and held in position by means of an intervening layer of fibrous connective-tissue, as described by Owen, only the anterior or convex surface is provided with a thin layer of enamel, whereas the posterior or concave aspect is lacking this tissue. Hilgenderff states (*Berlin Akad. d. Wiss. Monatsbericht*, 1865) that the incisors of hares differ from those of all other rodents, in having enamel all around them, although very thin at the back. This thin layer is present, but it does not present the features of enamel, but rather a tissue kindred to cement,—devoid of cement corpuscles, however. Tomes says ("Dental Anatomy," 1882, page 366) that "a thin external coat of cement is found upon the back of the tooth, but is not continued far over the face of the enamel." If he had left out the word "far," I would have had no good grounds for disputing his statement. As it is, I will admit only that a thin coat of cement is present on that portion of the incisors inclosed in the jaw-bone. There exists, however, a coat of bone-tissue over the enamel of the posterior surface of the fifth or last molar of a two-months'-old animal. Owen states that "there is not only cementum present, but it covers the enamel." He says ("Odontography," page 399): "The teeth thence projecting consist of a body of compact dentine, sometimes with a few short medullary canals continued into it from the persistent pulp-cavity, with a plate of enamel

laid upon its anterior surface, and a general investment of cement, which is very thin upon the enamel, but less thin in some rodents upon the posterior and lateral parts of the incisors." As before

Fig. 1.

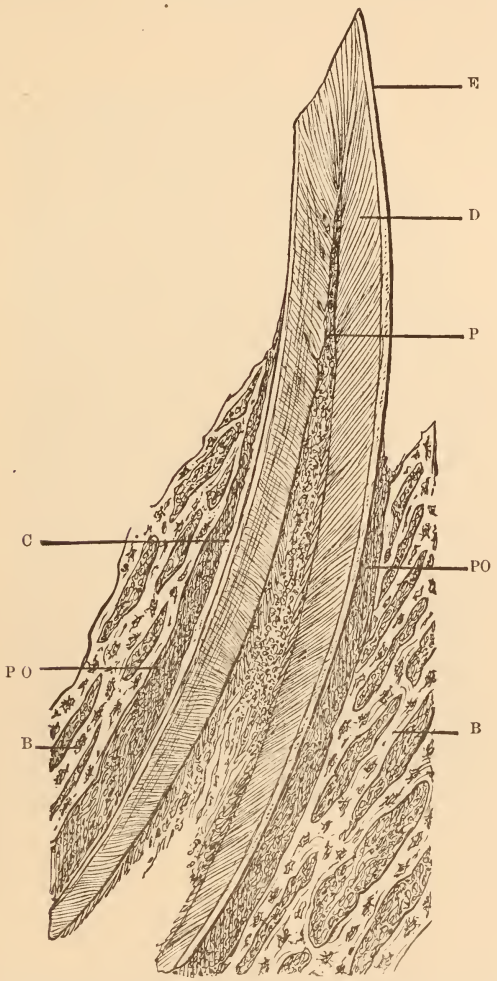


Fig. 1.—Lower incisor of a Rabbit two months old; *vertical section*. E, enamel; D, dentine; P, pulp; C, thin layer of a tissue kindred to cementum; PO, periodontium; B, bone. × 20.

stated, I have been unable to discover the slightest indication of the presence of cement covering or partially covering the enamel of the incisors. The enamel slightly protrudes at the cutting-edge of the

incisors, as stated by Owen, and the dentine produces a sloping surface downward and backward, always making a complete investment around the pulp-tissue. (See Fig. 1.)

With low powers of the microscope we observe a striking difference in the structure of the dentine between the anterior and poste-

Fig. 2.

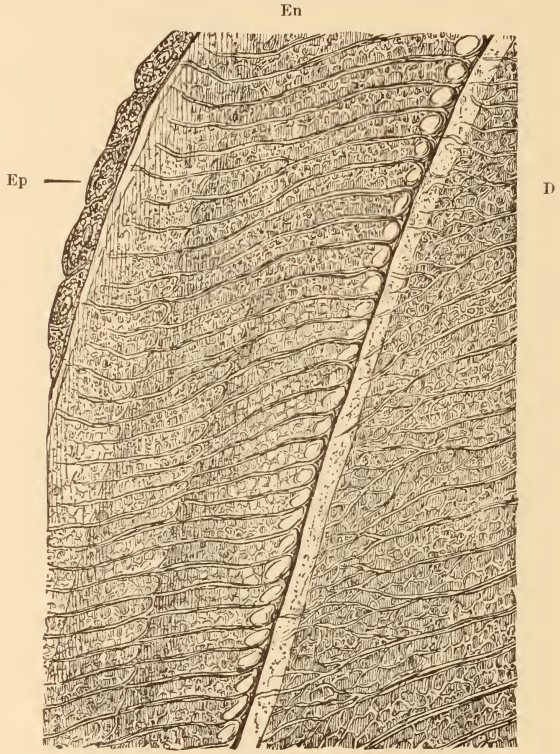


Fig. 2.—Anterior portion of an incisor of a full-grown Rabbit; *vertical section*, obtained by grinding. D, dentine; En, enamel; Ep, flat epithelium covering the anterior surface of the enamel. × 800.

rior portions. In that portion anterior to the pulp-canal the canaliculi are arranged with great regularity, running an oblique course either upward or downward and outward, and becoming nearly horizontal at the border of the dentine. The latter feature is especially marked in the upper portion, or toward the cutting-edge of the tooth, while that portion posterior to the pulp-canal shows the canaliculi arranged at less acute angles, and much less regular.

The pulp-canal is a cone-shaped cavity occupying the center of the dentine in a rabbit two months old, whereas in a full-grown animal the pulp-canal is much narrower and runs eccentrically, with a coating of dentine thicker anteriorly than posteriorly to it. In the young animal the dentine shows very few and narrow medullary canals near the border of the pulp-canal, while in the full-grown such canals are very numerous, especially in the lower or root portion of the tooth. Again, such canals are less numerous in the anterior mass of dentine than in the posterior. Only near the root-end of the tooth do we find such canals nearly evenly distributed in both portions. The general direction of the canals corresponds with the direction of the canaliculi, this being slightly upward in the young and growing animal, and slightly downward in the old or full-grown. From these facts it follows, as stated by Owen and Tomes, that the anterior portion of the dentine is more thoroughly calcified than the posterior.

With higher powers of the microscope the structure of the enamel, which covers the anterior or convex surface of the dentine in an almost uniform thickness throughout its entire length, becomes plainly visible. It is composed of rods taking a slightly sigmoid course upward in the young and downward in the old animal. (See Fig. 2.)

The bases of the rods are very marked, almost rosary-like, in the grown animal, caused probably by the slightly oblique cutting of the section. The interstices between the prisms are narrow, and in many places show the extremely delicate fibers. The interstices reach the outer periphery of the enamel occasionally only; whereas the majority of them stop short of the periphery. The reticulum is conspicuous all throughout the prisms,—more so in the neighborhood of the dentine than at the convex surface of the enamel, where the minute structure, visible without the aid of any reagent, gradually fades away, until the outermost rim appears hyaline or structureless. This fact again coincides with the statement of Owen and Tomes, that the outer portion is more thoroughly calcified than the inner. Owen's assertion, however, that there is a marked difference in the structure of the two portions, I am unable to corroborate, as far as the incisors are concerned, though faint traces of a stratification of the enamel are to be seen. The outer periphery is covered with a single layer of flat nucleated epithelia, visible only upon that portion of the tooth protruding from the gum. The dentine with high powers of the microscope shows in its basis-substance a delicate reticular structure, more conspicuous even than in the provisional

teeth of man. The canaliculi, containing delicate fibers, bifurcate freely upon approaching the periphery near the enamel. Here a zone exists characterized by a lack of distinct structure, and most of the canaliculi stop short of this hyaline layer, only a few traversing it and reaching the interstices between the enamel-rods. The dentine back of the pulp-canal shows great irregularity in the course of its canaliculi, which become considerably widened as they approach the

Fig. 3.

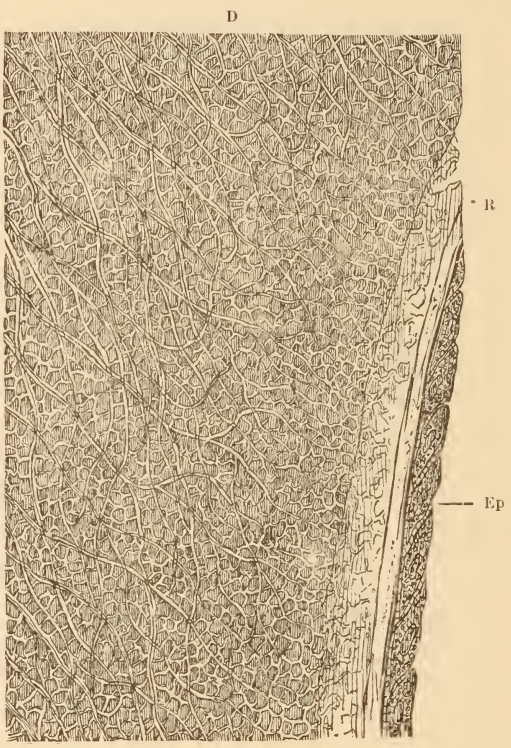


Fig. 3.—Posterior portion of an incisor of a full-grown Rabbit; *vertical section.* D, dentine; R, hyaline layer; Ep, epithelium. × 800.

concave surface. The general direction of the canaliculi is radiating, but numerous bundles run parallel with the surface, in an almost rectangular direction to the radiating ones. Near the posterior periphery the canaliculi of both directions unite in loops, and by their inosculation through an intervening reticulum a beautiful picture is presented. (See Fig. 3.)

The reticular structure becomes little marked in a layer near the concavity, and is lost sight of altogether directly on the periphery. Here, the same as on the convex surface of the enamel, a single layer of flat epithelia is seen covering the free portion of the incisor.

The pulp-tissue is medullary in the young and fibrous in the grown animal. In the immediate vicinity of the dentine odontoblasts or medullary corpuscles in a chain-like arrangement are seen in the young animal. The medullary tissue is traversed by a larger number of bundles of medullated nerve-fibers and capillary blood-vessels. Here and there globules of high refraction and without apparent structure are met with, which I conclude are depositions of calcareous matter. In the full-grown animal, where the pulp-canal is considerably narrowed, the delicate fibrous connective-tissue still holds a large number of capillary blood-vessels, which extend into the lateral offshoots of the pulp-canal, previously alluded to as medullary canals. Dentine traversed by such canals is known as vascular dentine, or vaso-dentine; but, as in the vicinity of the medullary canals, bone-corpuscles are often met with, the term osteo-dentine becomes quite applicable to the tissue, coinciding with the nomenclature of Tomes. In some places this vaso-dentine is bordered by formations kindred to odontoblasts, but, being shorter, rather resemble osteoblasts.

The pulp-tissue of the grown rabbit contains numerous calcareous concretions, greatly varying in size. In one of my specimens I have met with a formation closely resembling bone, supplied with a number of bone-corpuscles, whose territories are plainly marked. Obviously this mass deserves the name of "pulp-stone," and is of interest from a histogenetic point of view, since it demonstrates the close relationship existing between dentine and bone-tissue.

The borders of the dentine toward the pulp-tissue and the medullary canals are conspicuous by a lack of structure similar to the border on the outer periphery of the dentine. (See Fig. 4.)

The upper incisors, two in number, are markedly diverging in their root portions. Close behind them are two rudimentary incisors, known and described by previous observers. As to the deciduous teeth of rabbits which are spoken of by others, I can say nothing, since I have not examined these animals so early in life,—eighteen days after birth.

Rabbits have six molars in the upper and five in the lower jaw. Although separate teeth, they are cemented together into an almost continuous mass by intervening bone-tissue. I do not consider this

substance as entitled to the name of cementum. As it appears in the study of molars of full-grown animals, it is ordinary bone-tissue wedged in between the single molars, while in the young animal there is an intervening layer of fibrous periosteum, or periodontium, between the teeth their entire length. In order to give a clear understanding of the arrangement of the molars, I will state that

Fig. 4.

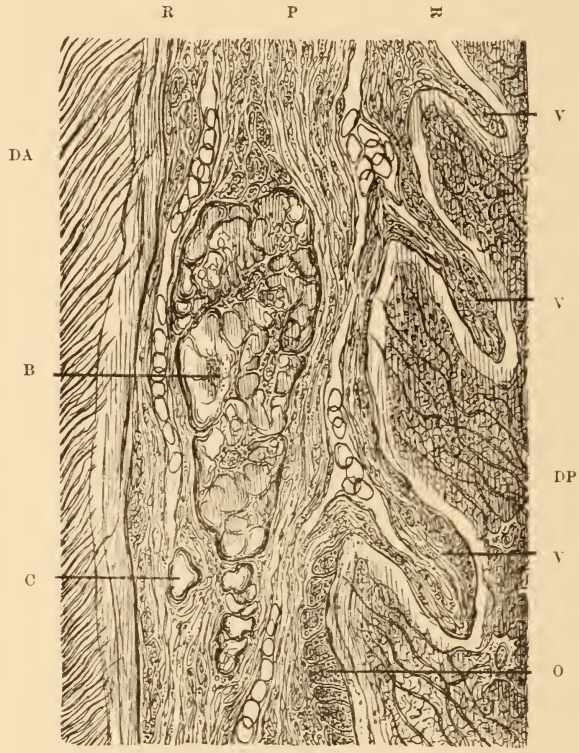


Fig. 4.—Pulp-canal of a lower incisor of a grown Rabbit; *vertical section*. DA, dentine anterior, and DP, dentine posterior, to the pulp-canal; R, R, structureless layer of the dentine bordering the pulp-canal; P, pulp-tissue with capillary blood-vessels, mostly filled with red-blood corpuscles; V,V,V, vascularized offshoots of the pulp; O, osteoblasts along the dentine; C, calcareous concretions; B, calcareous concretions with a number of bone-corpuscles; bone-corpuscles are scattered along the borders of the vascular canals. × 150.

each tooth is constructed in materially the same manner as the incisors,—viz., they are coated with enamel only upon their anterior surfaces. This coat becomes gradually thinner on the buccal and lingual surfaces, and is lacking altogether on the posterior surface. The structure of the enamel differs from that of the incisors, inas-

much as it is composed of two layers,—a fact to which John Tomes (Philo. Trans., 1850) first called attention as being present in the teeth of Rodentia, adding at the same time that two layers are missing only in hares and rabbits. (See Fig. 5.)

The first molar is the shortest and the fifth the broadest in the series. As the section from which the drawing was taken was cut nearly through the center of the teeth, we obtain a correct idea regarding the arrangement of enamel, which is seen on one side of the teeth only. It will be observed that the grinding surfaces are

Fig. 5.

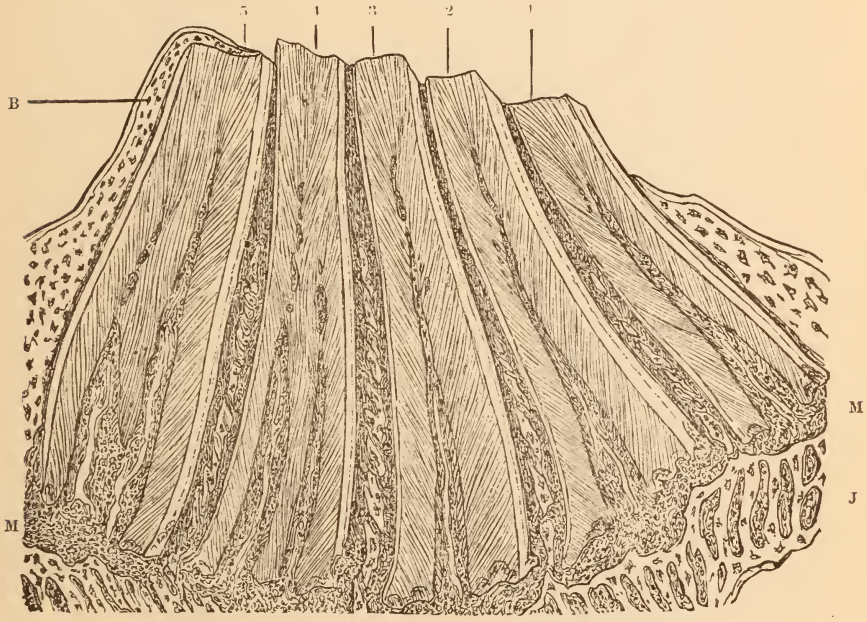


Fig. 5.—Lower molars of a Rabbit two months old; *vertical section*. 1, 2, 3, 4, 5, successive molars—1, the anterior, and 5, the posterior; M, M, medullary tissue continuous with pulp-tissue and the periosteum; J, J, jaw-bone of spongy structure; B, bone overlapping the posterior and grinding surfaces of the last molar. × 10.

irregular, the highest point of each corresponding to about the junction of the enamel with the dentine. In a set of molars obtained by grinding, from a grown rabbit, the highest point corresponds about to the middle of the dentine; from which fact we may conclude that there is no general rule as to the configuration of the grinding surfaces of the molars, it depending upon the bearings of the upper teeth.

The teeth are separated from one another by an intervening layer of periosteum, which extends upward to the level of the grinding surfaces, and contains in its middle portion trabeculæ of bone-tissue. To call this cementum seems to be entirely arbitrary, since it does not reach the lateral surfaces of the teeth; again, it develops in the middle of periosteum in exactly the same manner in which the jaw-bone is formed,—*i. e.*, first in the shape of cancellous bone, freely supplied with vascularized medullary spaces. In the full-grown animal there is no intervening layer of periosteum between the teeth, but the bone, likewise supplied with scanty and narrow medullary canals, is in direct contact with the lateral surfaces of the teeth; it also extends upward to the level of the grinding surfaces.

The dentine of the molars is constructed similarly to that of the incisors. The difference between the two portions, anterior and posterior to the pulp-canal, is most plainly marked in the lower or root portions, where the coarse reticulum produced by the anastomosis of the dentinal canaliculi is very marked on the posterior periphery of the teeth, where it is bordered, not by enamel, but by a dense, thin layer of an apparently structureless dentine. The fourth and fifth molars have two pulp-canals each, both in the young and the grown animal. In the former the canals are very wide; in the latter they are reduced to a comparatively narrow slit, holding a central capillary loop, and being supplied at its borders with a varying number of vascular canals. The pulp-canals reach different heights in different molars, sometimes approaching, nay reaching, the grinding surface. C. S. Tomes, in speaking of the behavior of the dentinal canaliculi at the grinding surface, says that "here the canaliculi are very much narrowed." I can corroborate this statement, and can say further, that in many places they are not only narrowed near the grinding surface, but their calibers are completely lost, the same as the caliber of the pulp-chamber. In other places, however, the dentinal canaliculi are apparently unchanged at the grinding surface, and look as if transversely cut through. No marked changes in the bone-tissue at the point where it reaches the grinding surface seem to have taken place either. Only the layer of bone overlapping the grinding surface of the fifth molar shows a dense, apparently structureless, terminal layer along its whole extent. (See Fig. 5.)

The enamel of molars of rabbits is of considerable interest, since it is composed of two distinct layers,—the inner one being the enamel proper; the outer being in contact with periosteum or bone, and composed of interlacing and decussating fibers. It will be

remembered that John Tomes makes the statement of Rodentia in general, that the enamel is composed of two layers, the inner being the decussating and the outer the plain enamel. In the hare and rabbit he did not discover the decussating, but the plain enamel layer only. I have not only found the two layers in the enamel of the rabbit, but have found the relations of the two the reverse of the

FIG. 6.

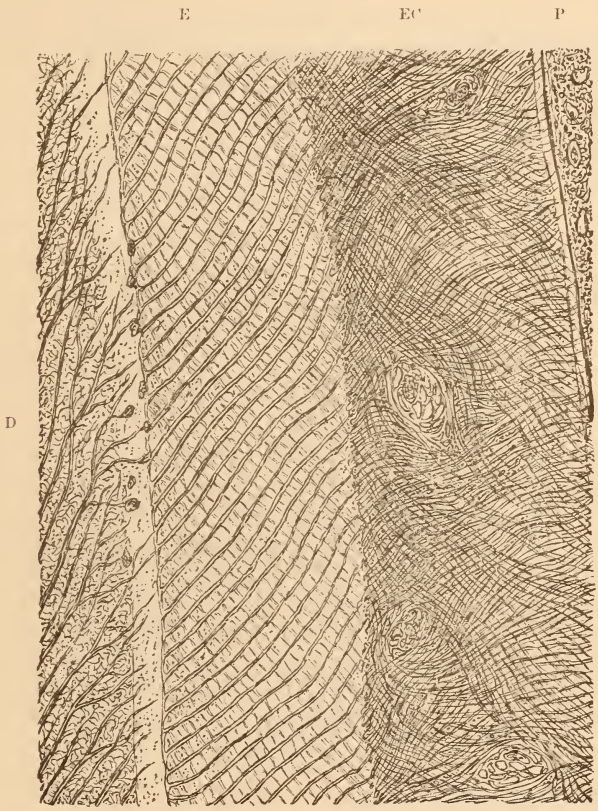


FIG. 6.—Root portion of a lower molar of a grown Rabbit; *vertical section*. D, dentine with small globular spaces at the border of the enamel; E, enamel composed of parallel rods; EC, cross-layer of enamel composed of bundles of decussating fibers; P, periosteum. × 600.

statement of Tomes. High powers of the microscope plainly demonstrate the presence of the two layers; the inner, nearest the dentine, is composed of parallel rods, slightly narrower than those of the enamel of incisors, and traversed at right angles by cross-bars. The outer layer, nearest the bone-tissue (eventually the peri-

osteum), is composed of delicate, wavy, calcified fibers, decussating mainly at right angles and traversed by interlacing bundles of such fibers, which latter, in a longitudinal section of the tooth, will appear cut transversely. In the latter group not infrequently small protoplasmic bodies are discernible, the presence of which is not so

FIG. 7.

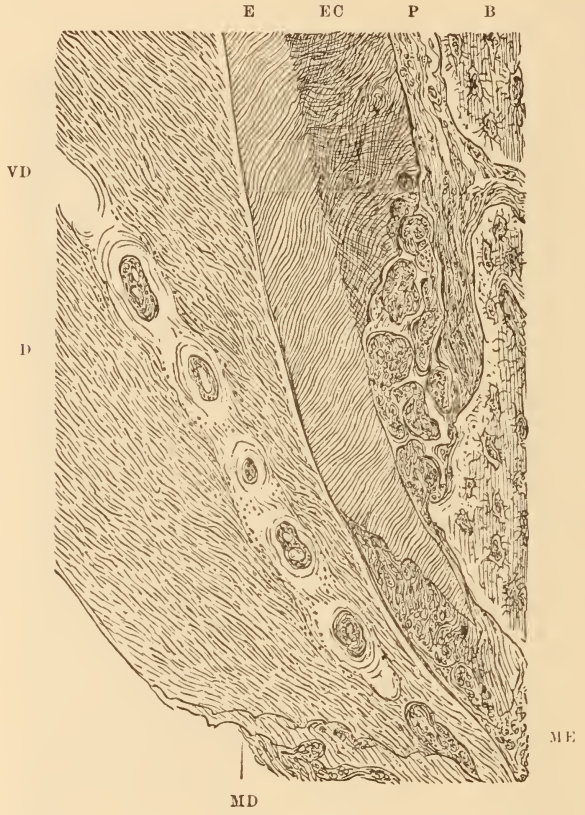


FIG. 7.—Root-end of a molar of a Rabbit two months old; *slightly oblique section.* D, dentine with obliquely-cut canaliculi; VD, vaso-dentine; E, enamel, composed of parallel rods; EC, cross-layer of enamel; P, periosteum; B, bone; MD, medullary tissue from which dentine develops; ME medullary tissue, the germ of enamel. × 100.

marked in the longitudinal section of the bundles. Although I am disposed to term this latter layer the "cross-layer of enamel," in accordance with the nomenclature of Tomes, I wish at the same time to express my doubts as to the real enamel nature of this layer, basing my doubts upon the study of the history of develop-

ment of the enamel in pig embryos, where a similar layer is found outside of the enamel proper. (See Fig. 6.)

Between the plain and cross-layers of the enamel there is no intervening zone, though the minute structure is strikingly different. At the border of the cross-layer toward the periosteum or bone, however, there is a thin, almost structureless, zone visible.

The relations of the four tissues entering into the construction of the molars is beautifully seen in transverse sections, in which the enamel, composed of two layers, is seen running along one side of the tooth only. This enamel tapers upon approaching the surface, made up of structureless dentine, and terminates toward the latter in an oblique line, not very distinctly marked. On such sections we see that the surfaces of the teeth are not even, but provided with furrows, which gives the transverse section of the tooth a lobulated appearance. The interstices between the teeth, including the furrows, are filled with bone-tissue.

The root-ends of the molars give an opportunity for the study of the manner in which dentine and the two layers of the enamel are developed, not only in the young but in the grown animal, since the teeth of rabbits grow continually throughout their existence. (See Fig. 7.)

The dentine at its base is supplied with bay-like excavations filled with medullary tissue. Such excavations exist also at the lower end of the plain enamel, though only slightly marked. The tissue close beneath this layer of the enamel shows a rod-like arrangement of the medullary corpuscles. Evidently both these tissues develop in rabbits in the same manner as in man. The cross-layer of the enamel shows at its bottom marked bay-like excavations filled with medullary tissue, in which there appear trabeculæ of a calcified basis-substance previous to the appearance of the calcified fibers.

In conclusion, I wish to acknowledge my indebtedness to Dr. C. F. W. Bödecker for a number of sections of the teeth of rabbits two months old, and to Dr. C. Heitzmann for the preparation of these beautiful illustrations and for other assistance rendered in the production of this paper.

DISCUSSION.

Dr. Barrett: This is reaching down to a study of the principles which we most desire to take into consideration. There are in the paper a number of points that surprise me. In the representation

in Fig. 6 there is something that I do not quite comprehend. I desire to ask the author of the paper whether there be a distinct line of demarkation between the regular enamel-rods and what he has illustrated here as the cross-layer of dentine. I also desire to ask whether these be enamel-rods at all. It would not appear that the regular enamel-prisms are carried over a certain line. I would like information as to whether in this tooth the enamel-prisms are continued, or whether the entire structure of enamel is as represented by the drawing. I would like to ask a little more light upon another point, and that is in regard to the direction of the dentinal fibrils in the posterior side—as I understand the paper—of the incisors, they having an upward direction at the lower portion and a downward direction at the upper portion of the tooth. These teeth having persistent pulps and continually growing forward and growing out, it is to me entirely incomprehensible, without an entire change in the structure of the tooth, that the direction of the dentinal fibrils in the procession of the tooth-growth from this persistent pulp could change.

Dr. Abbott: In answer to the question of Dr. Barrett, I will state that the prisms of the regular enamel seem to be in direct contact with the "cross-layer," with no intervening space; nor is there at any point an invasion of the cross-layer by the prisms of the enamel proper. It is a curious feature in the enamel, and it is strange that Owen does not speak of it at all.

Dr. Atkinson: He figures it but he does not describe it in the text.

Dr. Abbott: It will be observed that the canaliculi upon the anterior portion of the incisor, starting from the pulp-canal, run upward and outward, while those in the incisor of a two months' old animal run downward and outward. Whether this is indicative of a difference in variety of the animal, or of a change in the structure of the teeth as age advances, I am unable to say.

Upon the back or posterior part of the tooth may be seen the thin layer which Hilgendorff calls enamel, and of which Tomes says: "I have not been able to satisfy myself that the thin layer at the back of the tooth is enamel, and am disposed to regard it as cementum." I am unable to satisfy myself that it is either enamel or cementum, inasmuch as it does not present the structure of either, but has the appearance of a hyaline or thin, structureless layer. Apparently, the same layer is present in other places upon the teeth of rabbits, even covering, or partially covering, the enamel. It may

be seen very distinctly, the enamel-rods losing themselves altogether in it.

Dr. Atkinson: I want to call attention particularly to the different views of the different investigators who have dealt with this question. According to Tomes's opinion, the more distinctly pronounced of the two layers of enamel were cross-layers and external, and Dr. Abbott figures them as internal in the tooth; and there is one item that I have seen macroscopically more than microscopically in the rodents that I have dissected,—the beaver and the woodchuck. All who have seen these will notice that the external layer of the rodent incisors is stained where they have fed on trees,—oak and hemlock; where the beavers feed on these trees you will see the external layer stained. That staining has been differently interpreted. It has been said it was not cement; but the cement-corpuscles in those cases are made up of unpronounced corpuscles, or so very finely pronounced as to be difficult to see under anything but high power. The same thing occurs on the necks of human teeth where the cement ceases to be considered cement, because the hyaline structure, made up of similar connective-tissue, is not of sufficient size to admit normal cemental corpuscles having living-matter in them. If I understand Dr. Abbott, he has not seen this external layer of cement over the layer of enamel on the round or external face of the tooth. I would call attention to that, so that in further investigation we may get a better hold of the real structure that is there. As to the bibliography of this matter, there is a good deal in Owen that the workmen did who cut the sections and made the drawings faithfully that was beyond his penetration. He being at the head, and having these workmen at his disposal, utilized their work as far as he understood it and as far as they understood it; but you will see in the human tooth represented in Owen's "Odontography," that the structure that has been proved so clearly by Bödecker's investigations is marked,—delineated handsomely,—and almost after the manner of the cross-lines of living-matter that are now claimed to run through between the canaliculi and in the dentinal structure.

Now, let us take that same question with continued effort, and go on and cancel misconceptions at each successive step, and one of these days we will not hear people saying that a negative opinion is to be considered of any value when in opposition to a positive assertion made by earnest histologists.

Dr. Abbott: If I have read them correctly, both Owen and

Tomes state that in the hare and rabbit, unlike other Rodentia, there are not two layers of enamel upon any of their teeth. I have not studied teeth of any other Rodentia, but upon the molars of rabbits I have found two very distinct and unlike layers of enamel which are very beautifully shown in the drawing.

Dr. Atkinson: This question of the two layers of enamel came up in Heitzmann's laboratory, one specimen beautifully stained with carmine and the other without staining, and then another agent which had an affinity which would stain the internal ring leaving the external ring without the stain. These are questions worthy of investigation, and we had better look into them, speak of them, and call attention to them. To my own comprehension there is something finer than has been recognized by the mass of histologists, in the way of the consideration of what I call stored radiancy, that is the immediate antecedent of affinities between coloring-matter and the various structures. It is well known that nitrate of silver colors some structures so as to bring them out beautifully, so that when we see representations made from colored specimens they charge the individual who makes the drawing with over-drawing what he saw, because they do not have the reagent at command themselves, and have not made sufficiently numerous observations to entitle them to opinions about it.

Dr. Barrett: Some years since I made a series of slides from the teeth of rabbits and also of the common squirrel (*Sciurus Carolinensis.*) I do not know whether it was because my eyes were not sufficiently sharpened, or whether I was not sufficiently educated to be able to see and recognize clearly the peculiarities of structure which have been represented so graphically in these drawings, and which have been referred to in the paper, but they were not then apparent to me. The change in the direction of the dentinal canaliculi is rather incomprehensible. It does not harmonize with the in sufficient knowledge which I have of the histological interpretation of the process of development of the incisor teeth of this class of animals, the Rodentia. It is inconsistent with my idea of the growth and procession of these teeth; but I cannot say too much concerning the importance and the necessity for such observations and such papers as this. If we are to be a scientific body, and to be reputed and accepted and acknowledged as scientific men in the world of science, we must do scientific work. We cannot gain such a status by ordinary dental laboratory work. We have got to rise to the plane of the study of comparative anatomy before we shall have

the scientific status of the profession in England of to-day. We in this country pride ourselves upon the practical character of the work which we do and the investigations which we make, and that indeed is something which is extremely essential; but at the same time there must be those who go in advance and lay out the work and open up the way and blaze the trees on the path which we are to follow, and we can only determine very much of the practicality of dental work by a comparative study of the human teeth with those of the other classes of animals, and I do most earnestly desire here to express my sense of gratitude for the production of such a paper as this. It rises to the plane of my conception of what we ought to be,—I will not say of what we are, I will not even say of what we expect in the immediate future to be, but something of what we ought to be,—and it is but a poor encouragement which we give for the production of such a paper as this when only a part of the members remain to listen to it. I would not for a moment deprecate the importance of practical matters, but "man shall not live by bread alone." He needs something besides, and dentists, if they are to be scientific men, are not going to attain reputation by the mere extraction of teeth and the insertion of red-rubber plates.

Dr. Peirce: I want to say that I thank Dr. Abbott from the bottom of my heart for this presentation of the subject, and also to emphasize the thought of Dr. Atkinson that it is germane to our studies. It is what we need. We will never appreciate the development of the teeth of the higher animals, including man, until we learn something of the development of the teeth of the lower animals. We must trace that process from the embryonic structures of the lower types up through the different classes of animals until we come to the highest. In making comparison between these beautiful diagrams and those illustrating similar tissues in the human species we should remember the difference in function. Here we have a tooth growing throughout its life. The tissue is not perfected and then allowed to remain in that condition, as in the higher mammals; but there is a constant loss and renewal. We have what we term the permanent pulp at the base of these teeth, which produces and reproduces these hard tissues, so that as the structures are worn off at the edge of the tooth they are constantly supplied by the nutrition furnished at the base. In them we necessarily look for such a modification in the structure as would correspond with the modification in function. We find in this tooth

which is here illustrated the anterior border of dentine is more dense than that of the posterior border, and the enamel covering it is still more solidified, whether it be the outside or inside layer. We have illustrated the projections from the pulp into the dentine, which correspond to the projections of the odontoblasts in the human tooth; but those running into the anterior layer, which is the more dense structure, are small, and by virtue of the size detract less from its density, and yet supply all the sensation essential. In all my studies I am a little inclined to look at things from one side, in the effort to see if possible the cause of modification of structure, and wherever I see tissues performing similar functions in different animals I want to see why those tissues have differed, and whether that difference corresponds with the difference in function or use, believing that that is an important factor in the modification of all structures. The beautiful illustration we have of the molar gives a very definite idea of the original distribution of this tooth into independent germs, which finally in their development became cemented together to give us one grinding molar.

Another fact in connection with these teeth may be noted. We remember in the human family we have a deciduous and permanent set. The former lasts from eight to twelve years in the human family, while here the deciduous set are simply developed in the embryo, and by birth, or a few months after, they prove functionless and are thrown off, the permanent set taking their place and lasting through the life of the animal. This is true of all rodents. They have a very short life, and wherever we have a tooth growing from a permanent pulp we have just that condition of the deciduous teeth.

Dr. Abbott: It is very interesting and instructive to observe how nature has provided for the constant growth of the teeth of animals which live entirely upon vegetable substances. Were this not the case, their teeth would, very early in life, be worn to the gums, the pulps become exposed, and the animals suffer greatly in consequence.

SECTION V.

Materia Medica and Therapeutics.

Report by A. W. HARLAN, Chairman of the Section.

THE year just closing has been one of great activity in the reports of therapeutic progress. Every dentist is beginning to feel the necessity for a better understanding of the action and uses of drugs and medicines, and the knowledge gained from experimentation with remedies is being utilized in daily practice. We seldom find a progressive practitioner, even in the smaller towns and hamlets, who does not use his well-selected stock of remedies with intelligence.

Progress does not necessarily imply the discovery of new agents to swell the list already growing larger year by year, but it means increased knowledge of the properties and indications for use of those remedies at present known, the discarding of harmful medicaments, and the prescribing of such as will fulfill the object aimed at in the relief or cure of diseased conditions. Would anyone contend that it was proper or safe practice to use chromic acid—a powerful escharotic—as a dressing for a flesh-wound, when an aqueous solution of resorcin or bichloride of mercury was indicated? I think not. It is on the ground of a better understanding of the causes of pathological conditions that modern dental practice is based. It is a sure sign of advancement when practitioners are able to recognize the difference between the true and the false, and to boldly maintain the correctness of their diagnosis by the presentment of correct lines of treatment. The empiric may blunder into the discovery of the virtues of a certain remedy, but the attempt to convert it into a specific will certainly fail when it is applied outside of its legitimate sphere.

This is as gratifying to the students in pathology and bacteriology

as was the report in former times of the discovery of a new method of pivoting teeth or the mode of capping a pulp to the old-time practical dentist, who cared little for any scientific basis leading to practical results. In the dental therapeutics of capping exposed pulps, the treatment of the peridental membrane, the disinfection of roots, and the drainage and cleansing of alveolar abscesses or diseased antra, and the multifarious pathological conditions of the mucous membrane and alveolar process, very decided progress is to be noted. There is to-day little or no uncertainty with reference to the outcome of stubborn cases coming under the professional care of the dentist. The old empirical methods are being discarded for the new and the scientific. Roots of teeth are not packed with medicated cotton or silk for months before filling, as was formerly the universal practice. It is well understood that daily changes of root-dressings are not only harmful, but that they retard the healing of abscesses located beyond the apices of roots.

Pursuing the subject still further, some practitioners advocate the immediate filling of roots, no matter what the conditions in the canals or in the territory beyond them. In this connection it may be well to sound a note of warning. We will assume that it is safe practice to fill the roots of all teeth as soon as the pulps have been removed, referring to pulps of teeth destroyed by the use of arsenic, the driving of wooden pegs into them, or their immediate destruction by means of the electric cautery or other surgical methods; also, all cases where a fistulous outlet has been found leading to the gum or otherwise; but excluding those cases where pus or other fluid exudates are drained through the root-canals. It may be that no danger will arise from the sudden stopping of a root, the end of which is encysted, or even where the canal is perfectly dry when first opened into, if complete disinfection has been practiced. On the other hand, it is questionable whether it be safe practice to permanently fill the root of a tooth at the first sitting, when moisture or pus is found to ooze into the canal which is opened under antiseptic precautions. The tissues—bony, soft, and muscular—are not alike in the mouth of every patient who presents himself for treatment. All teeth are not implanted to the same depth in the sockets, and indeed no two cases are just alike, even in the same mouth, to say nothing of the general bodily health of the individual. Pulpless teeth are seen in the mouths of both old and young, many of which contain fillings, and a still larger number are without them. Some have been perfectly quiescent, and others have given rise to

more or less pain. Now it is proposed to fill all such roots at the first sitting, relying on the immediate cleansing and disinfection of the canals and abscesses for the prevention of pericemental inflammation or the formation of an acute abscess. Counter-irritation is proposed by some, and the administration of constitutional remedies by others, to avert any possible disaster. If the roots of teeth were approximately straight, or if all teeth possessed single or even double roots and these teeth were located in the upper maxilla, so that drainage through the process could certainly be secured in all cases, it might be possible to safely treat them and fill at once, if the general health of the individual was such as to warrant the taking of the risk. But this is not the case, as every one present will testify. It is known to anatomists that very many roots are twisted, curved, and bent in various directions; that the canals in some roots are exceedingly minute and flattened, especially in molars and bicuspids; and that often the roots of inferior molars are difficult of access, while drainage can only be secured by surgical means or by using powerful suction. If the attempt is made to cleanse and disinfect such canals and the probable pouch or sac beyond the apices, without perforating the alveolar process opposite the ends of the roots, disaster is pretty certain to follow the immediate root-filling. This will apply to the inferior incisors likewise. Many superior molars and cuspids may be classed as among the teeth where it is difficult to secure perfect drainage in a short period without surgical interference.

Many operators who ride the hobby of immediate root-filling are not provided with the delicate instruments necessary for removing fragments of the pulp and all septic matters. They do not use the precaution of bathing the tooth and the rubber-dam which encircles it with a proper disinfectant, and they frequently, in ignorance, choose disinfectants which are powerful coagulators of albumen It is impossible for the degree of success to result from such operations that is claimed by those who practice them. If the practice of immediate root-filling could be at all commended, it would be only under the condition that all the foregoing considerations were carefully observed, and also that sufficient time should be allowed to elapse after the application of the disinfectant to insure the complete decomposition of mephitic gases and the destruction of microbes and their spores. The roots of all such teeth must afterwards be filled with the most unerring certainty. Again, there are many of the advocates of this practice who propose to fill all roots at once, without reference to the constitutional conditions of the patient

or of the conditions immediately surrounding the tooth. Now, under such circumstances, no matter how perfectly the operation of filling the root-canals may have been performed, there could be no assurance felt of the results in all such cases. In the reports of the methods of treating and filling roots there is no similarity either in the methods pursued or the disinfectants used. Some use 95 per cent. carbolic acid; others peroxide of hydrogen, iodoform, and 1-1000 solution of bichloride of mercury, and others still differing and some indifferent medicaments.

There is still greater diversity in the materials used for filling roots: orange-wood, cedar sticks, oxyphosphate and oxychloride of zinc, gold wire, gutta-percha, lead, tin, cotton, and silk have all been used by the immediate root-fillers. The absurdity of using wooden sticks with which to fill roots, in the expectation that no bad results will follow such an unmechanical and unscientific method, would be laughable were not the immediate root-fillers in earnest. Time sufficient has not elapsed to prove the total worthlessness of this make-shift of a root-filling. It matters not how potent the disinfectant may be which is used, no reliance is to be placed on the soaking of wooden points in it to prevent future trouble. Non-coagulators of albumen, or those having very feeble coagulating properties, are indicated every time for the disinfection of root-canals, pouches, and sacs. Peroxide of hydrogen, solutions of bichloride of mercury, essential oils; iodine, bromine, or chlorine water; aqueous solutions of aluminum, potassium, or other salts of metals, are to be given the preference in all cases. The crystalline bodies obtained as by-products in the distillation of coal-tar, which are freely or sparingly soluble in water, are to be commended for disinfecting purposes. A root-filling material must be non-irritant and not dependent on its acquired antiseptic property, which is always evanescent; it must be easy of introduction, and not acted upon by acids, alkalies, or ferments, and impervious to moisture. The danger of a swollen jaw from immediate root-filling, and the possible loss of a valuable tooth, or caries or necrosis of the alveolar process, is always imminent where drainage is not made possible by previous treatment. The necessity does not exist for such celerity in the filling of roots in the cases under consideration.

A little time, with temporary dressings in the canals, is always well spent in bringing about a successful issue, without the attendant distress and risk mentioned above. Discrimination in the use of remedies is also dictated by sound judgment, and a wise conservatism is

safer than the heedless pursuit of an *ignis fatuus*, which will lead to uncertainty in the final result. The care and treatment of pulpless teeth forms a large part of the practice of many dentists, and if a mistake is made by the too sudden closing of the apices of the roots of these teeth, no one can foretell the possible disastrous consequences. The immediate root-filler, by the performance of this operation in such haste, may not hear of the subsequent result for a long time, but sooner or later the word will reach him that the tooth has caused such trouble as to result in its extraction, or that the removal of the filling or the perforation of the alveolar process to secure for the patient relief from pain has been practiced by a coadjutor of the original operator.

A bad result following immediate root-filling has a tendency to weaken the confidence of the public in the value of such operations, and many useful teeth will be lost though dread and fear, from the failure of a few such ill-advised and hastily-performed root-fillings. We have no dread of being thought too conservative in the treatment and care of these teeth, and our word of warning is uttered, not to impede progress in the practice of dental surgery, but to point out some of the dangers that lie in the path of the immediate root-filler.

SECTION V.—Continued.

A Note on the Value of Resorcin in Checking the Production of Pus around the Roots of Teeth.

By A. W. HARLAN, Chairman of the Section.

IN the treatment of loose teeth I have found that after the deposits of serumal calculus and other foreign matters are removed, and the pockets or recesses around the roots have been cleansed by the use of peroxide of hydrogen, a ten per cent. aqueous solution of resorcin is one of the most efficient and certain agents to prevent the formation of pus in those obstinate cases which are so troublesome to many dentists. I have had several cases which failed to respond to a faithful use of tartrate of chinolin, iodide of zinc, Dr. Black's 1–2–3, and other remedies, but speedily yielded to treatment when the above-named solution was injected into the pockets as often as once per week. I need not at this time enter into a description of the properties and uses of resorcin in dental surgery, as I read a paper before the Illinois State Dental Society, in 1885, on resorcin and pheno-resorcin, which was published in the transactions of that society, and also in the Dental Cosmos for January, 1886. It may be said by some one that the cases for which this remedy is recommended might recover without treatment, but this has been proved to be untrue. I can only urge a trial of the treatment proposed for a substantiation of the above.

DISCUSSION.

Dr. Barrett: I have never followed the practice of the immediate filling of the roots of teeth after devitalization, yet I can readily conceive, and so can all of us, of circumstances under which the immediate filling of a root of a tooth would probably be the most judicious treatment. If there be no septic condition and no in-

flammations, it may be, in many instances, perhaps, advisable that the root be filled immediately. I am satisfied of the real existence of the danger to which the paper has alluded, that of over-treatment of root-canals. I believe I have in my own practice sometimes treated the roots of teeth altogether too long, or have changed the treatment too often. Where an antiseptic is demanded, it depends upon the septic condition of the root-canal as to how often the change shall be made. I have seen instances in which I felt that it was an absolute necessity to change the root-dressing twice or three times a day. Of course, that would be under exceptional circumstances, but they may arise. The later observations in regard to the treatment of root-canals, the better knowledge which we have obtained concerning sepsis and antisepsis, have materially modified the practice in this class of cases. In the early days I have heard it many times urged that the filling which is to be finally introduced should be an antiseptic filling, and that cotton made an excellent filling for the roots of teeth, provided it be thoroughly soaked in some antiseptic. I never have subscribed to that doctrine. I want my root-filling just as nearly neutral and as bland as it is possible that it shall be, and to approach as nearly as may be to the natural condition of the tooth. I want it to be a plastic, because it is necessary to fill very small and tortuous canals and hidden chambers. I do not want it to be an antiseptic, because after I have got through with the treatment of the root-canal I expect it is in a proper condition for filling, and I want nothing of a medicinal nature within it.

Dr. M. L. Rhein: We will all come in time to practice more extensively the immediate filling of root-canals, even though the honored reader of the paper opposes it at the present time. The first thing to be obtained is the aseptic condition of the canal. With the improved drills that we have at the present time there is no difficulty in going to the apex of any root at the first sitting. The objection is made that it is not the proper thing to enlarge the canals of the teeth, and that only the finest broaches should be used for this work, and that to cut away any of the interior portion of the canal is bad practice. A better aseptic condition can be reached by burring out the canal all the way up than by any other means. In canals in which the pulp has been in a putrid condition for some time, the canaliculi take up septic matter, which may be more quickly removed by burring it out than by medication. After this is done, if the bichloride of mercury, or what is even better than that, the iodide of mercury, be injected to the apex, you get a condition of the canal

that there is no possible question about, and the immediate filling of such a canal with the proper material leaves the tooth in as good condition as though you had seen the patient a dozen times. If, as the paper suggests, there has been trouble on the other side of the root, beyond the apex, and you meet with such trouble afterward, there is only one course of treatment to be pursued, and that is to enter through the alveolar process. In such cases the future treatment can be pursued with much more facility and less trouble and annoyance to the patient if you have nothing further to do with the interior of the root-canal.

Dr. Ottofy: While I agree with the reader of the paper on most points, and indorse the warning which he has given as to this kind of treatment, I nevertheless do practice immediate root-filling, carefully of course, and always selecting proper cases. This subject was up two years ago in the Illinois state society, at which time Dr. Harlan read a paper on a similar subject, the discussion of which I opened, referring to this matter of immediate root-filling. I was hauled over the coals pretty thoroughly by the speaker before the last, who I am sorry to say has stricken out everything he said in reference to that subject from the minutes of that society, and although I felt the blows I nevertheless thought I was on the right track, and since then the question has been more and more discussed, and a great many are following the practice. At that time I had perhaps seventy-five cases of immediate root-filling, and I admitted a number of them had failed, but in anyone's practice that will occur. I can now almost to a certainty tell whether a given case will be successful or not. In a discussion a little over a month ago in the Odontological Society of Chicago, I discovered from Dr. Harlan's remarks that he was really practicing immediate root-filling to a larger extent than anyone would suspect. The question arose as to what percentage of roots were filled immediately, and I think he stated that at least sixty per cent. of the roots which he fills he fills immediately. That is perhaps quite the general practice, but at any rate it was not my practice four years ago. Aside from those cases where an alveolar abscess with an opening exists, if the root is thoroughly clean and free from all septic matter it may be filled immediately. The remedies we now have at hand will render such canals aseptic immediately, and I see no reason for a change of medication. Many cases which were formerly treated four or five times can be treated twice or three times and then filled, and a large number of others which formerly required but two or three treatments can be

filled at once. It is my practice, I think, with seventy-five per cent. of pulpless teeth, to fill them immediately, and in a majority of them to introduce a permanent filling at once. Of course I select very carefully the cases, and I believe I am tolerably certain when the root is perfectly aseptic and as clean as it can be. I do not try to fill immediately a root I cannot perfectly explore; hence third molars are not generally filled immediately, and second molars frequently are not. All others can be filled immediately. As to the selection of the patient, I want a robust, healthy person where there is as little disease about the mouth as possible, not a lymphatic, sickly one, in whose mouth the gums are inflamed or irritated, or where much salivary calculus is present. The first thing I use is chloroform. That is followed by bichloride of mercury, one in one thousand, and then I use eucalyptol and iodoform, and then introduce the regular gutta-percha filling.

Dr. Atkinson: We are in serious conclave. The nomination of the paper I admire, but when the text is not followed out so as to give us the grasp of the mental apprehension of the significance of that text, I doubt the value of the paper. There is not one single point of true therapy clearly made out in the paper, and we must either know more than has been pronounced or read between the lines for ourselves to make it of any advantage to us other than as a bugaboo, and where anyone cries bugaboo you may be sure that there is lack of definiteness of perception of what the thing is that you are afraid of. A little dogmatism sometimes is good because it rouses people who think they know it all. The system must be out of order to admit of an abscess in the human body. Deterioration of pabulum reducing the tone of its metabolism lays the foundation for possible infection. We must take that into account when we are talking about having things in an aseptic condition. Who has penetrated the subject deep enough to be entitled to an opinion of whether a case is in an aseptic state or not? If you have pain, tenderness or a local abscess, you are very certain that retrogressive metamorphosis of the nutrient activity of the part has been at work, and then if you know whether it is a micrococcus that has been the immediate antecedent of the retrogressive movement, and you know what will kill that, or what will extirpate it, that is very well. Wherever there is no pericementitis upon a root that has lost its pulp, and it is desirable to secure it against further deterioration, clean it out and fill at once. If you are sure that the apex of the root has been encysted, you need not go through the end nor use

any antiseptic. Dr. Barrett, in the main, as I gathered his perception from his words, is correct in saying that a healthy tooth needs nothing but to have foreign matters excluded from the root-canals. Provided the pabulum is sweet,—that means a healthy tooth,—even simple occlusion is all that is required. Any impermeable substance that has all its affinity for oxygen satisfied is a proper filling for that root. We must get better apprehension of what constitutional difference means, before we shall be able to determine who is going to have an abscess and who is not, after the extirpation of a pulp. There is one thing in the paper that is, like very much of Dr. Harlan's teaching, capable of being interpreted in two or three ways, and hence detrimental to young men who wish to understand it. He asserts dogmatically that anything that will coagulate albumen is not fit to be used in the treatment of the root-canal. That is the process by which healing takes place in every instance where a tissue has been broken. It is that very thing of coagulating albumen, and don't you forget it. We have to understand the chemistry of the fibrillation of lymph and understand the degree of heat present in the formation of that little vulcanite, which that coagulated albumen is, that has satisfied fully its desire for oxygen which renders it such a complete dressing in any locality where nutrition is to be nil. Chloride of zinc has repeatedly been introduced to preserve exposed pulps, that has converted the entire pulp throughout the length of the canal into a hyaline coagulum that has proved just as good a filling as can be, and has stood from year to year without change and without coloring the teeth or giving any indication of any retrogressive movement whatever. He said he would use bichloride of mercury, but he would not use chromic acid. What is the difference? It is simply a difference of attenuation, and we must understand these fine affinities between the substances that we call medicines and the tissues that we are dealing with, to enable us to know whether we are getting an antiseptic or a coagulant effect. If you will take one in four hundred of chromic acid, you will get pretty nearly an equivalent of one in a thousand of bichloride of mercury, and they are both coagulants. They do vulcanize or cook albumen so as to render it an inert and non-putrescent body. I could go on all night and talk about this subject, but probably have given you hints enough to induce you to study it somewhat before you rely upon such ambiguous instruction as that presented by so high an authority to-night.

Dr. Peirce: Do we realize how tolerant nature is of our incessant

blunders? For thirty years carbolic acid was used almost exclusively in the treatment of roots, and during that period I am inclined to think that quite as large a proportion of teeth or roots were maintained in health as with more modern treatment, and now we are told that an escharotic must not be used. If I have a pulp devitalized and am sure I have cleansed the root or roots thoroughly of all pulp-tissue, I do not want any antiseptic material in it. It is safe from all future disaster, unless some constitutional trouble should, in consequence of the disturbed nutritional condition, inflame the pericemental membrane, which I do not anticipate if the root is well closed at the apical end. If this should be the case, it would not matter whether the antiseptic was inside of the root or not, so far as that result was concerned. If I have a tooth in which the pulp has been dead for months, or may be years, having an abscess without a fistula, then I need to be more careful in the filling of its root, and I want to recognize the fact before I fill that tooth that there is no accumulation that I am closing up that must find an exit through some other channel than the root. On such a root I would not want to operate until I felt satisfied that I had stopped any further exudation of lymph, and after I was satisfied that that was done I should fill the root, and not before. If I have a tooth in which an abscess is already established, and the tissues are being relieved through a fistulous opening, I would purify the root and fill it at once, and if the abscess did not correct itself within twenty-four or forty-eight hours I would treat it from the external opening. I think the sooner the root is filled after you have it cleansed the better it is for the tooth, and then the fistula can be treated externally.

What we want to recognize is not only the condition of the root and the tissues around the root, but also the systemic condition of the patient, and when we recognize these and take them into consideration they must modify our treatment. Chloride of zinc I use freely. I use it continuously in the treatment of all roots where abscesses have been established, whether they are what we term blind abscess or those with fistula, and I think I get good and satisfactory results. Where the pulp has been recently devitalized, and I am satisfied I have the root well freed from organic tissue, I do not care to do anything more than wipe it out with a little iodine and carbolic acid.

Dr. Rhein: In cases where the pulp has been dead some time, and you have cleansed the root thoroughly at the first sitting, what advantage can you get by further treatment?

Dr. Peirce: If the tooth is in the lower jaw gravity carries the medicine to the structures around the root. If it is in the upper jaw, a little pumping effort answers the same purpose. When I have stopped the exudation of the lymph the tooth can be filled. I would like to ask Dr. Harlan what he means by drainage? If it is simply to give exit to the accumulation resulting from inflammation, without the effort to check it, that is the practice of fifty years ago.

Dr. Harlan: What I mean by drainage is the perforation of the alveolar process opposite the end of the root, after its immediate filling, where moisture or pus is found on opening into it, and where there is no fistulous outlet.

Dr. Peirce: I can readily see, if that is the practice, a tooth can be filled under any circumstances, for you establish an artificial opening for the exit of the accumulation you have there; but in Philadelphia we do not consider that good practice.

Dr. Guilford: So far as I have been able to hear and understand the paper I believe I may say I favor the views of the chairman of the Section, who read the report. In the treatment of dead or devitalized teeth we have two or three things to deal with, aside from the pathological condition. We have certain mechanical features of the case. First of all, we want to effect an entrance so that we can reach the root-canal in order to cleanse it and treat it and get it into a proper condition, and after that we want to fill it. In drilling into a tooth we naturally desire to have the opening in such position as to enable us through it to reach every part of the canal. The next thing is to remove all the débris and decomposed matter and in doing so avoid having any of it pressed beyond the foramen. Then comes the treatment of the case and afterward the filling. Some gentlemen speak of drilling the root-canal in order to enable them to accomplish certain results. I wish to say, and I think that most practitioners will agree with me, that the drilling of a root under almost any circumstances is a very dangerous proceeding. Anyone who follows that practice must be exceedingly skillful, or he will meet with cases of failure or get himself into serious difficulty. Anyone who has had anything to do with college or clinical work will have noticed how often bad results have followed that course of action; the breaking of the drill in the root, or more serious still, the perforation of the side of the wall. How often do we find a perfectly straight root, except in the case of the anterior teeth? I have had some sad experience in years gone by and others have had the same. The way to avoid it is to avoid drilling the

root. I do not say in all cases, but I do say in nine-tenths of the cases, to drill into the canal of the root is dangerous practice. What is the occasion for it? Why drill the canal of the root? Do we need to enlarge it? It seems to me, in the majority of cases where trouble arises from such an infinitesimal portion of the pulp remaining, that we can reach and treat those conditions without drilling the root. If on the other hand the root is large enough, and we drill it simply to remove a certain portion of the wall, I think it is entirely unnecessary. It is a dangerous practice to put a drill into the root of a tooth, and if we do it we ought to do it only under stress of circumstances. In regard to the immediate filling of the root after it has been treated, I think it is always best to be upon the safe side. It seems to me, if we have restored the parts to a healthy condition, and think we are justified in filling the root immediately, we are just as much justified in waiting awhile. By waiting you make yourself more certain of the results you think you have accomplished. If you fill immediately, you feel satisfied that you are justified in doing so, but the result may disappoint you. A little time will better test the results of the work which you have accomplished.

Dr. Hunt: What do you mean by "a little while?"

Dr. Guilford: I mean a few days.

Dr. Rhein: Do you never see any danger in allowing the root to remain open, admitting air?

Dr. Guilford: We do not leave it open to admit the air. Nobody would think of leaving a tooth open. By putting in a dressing it will be in a safe condition while we are waiting for results.

Dr. Hunt: The idea is that the air during that time is likely to produce serious results?

Dr. Guilford: I never saw any serious results following that. Suppose we do fill the root immediately and have trouble, what are we going to do? We have either to enter from the outside and use constitutional remedies, or we have to drill out that which we have placed in the root. I am not an advocate of that practice which leaves a root in such a condition that you can readily get at it in the future. I believe in making sure of my ground in advance, and after that is done fill the root with the intention of never opening it again.

In regard to the filling of the root, it seems to me it should be filled with some material that is neutral in its character, that will not undergo change, and that is not irritating. We have many materials of that kind, but I think the majority of practitioners to-day

fill the roots of teeth with either oxychloride of zinc or gutta-percha. Before the root is filled, a little pellet of suitable material should be forced up near the end of the root in order to close the foramen, so that what we place in the canals shall not go beyond. In a paper lately read before one of our local societies, a gentleman advocated the pumping up with fine broaches of a thin mixture of oxychloride of zinc until he was sure he had gotten it beyond the end of the root. Another advocated the pumping up of a solution of gutta-percha until he was sure it had passed beyond the foramen. Nature, he said, would eventually cause the surplus to pass out of the gum in fine, worm-like filaments. Think of such practices! In placing anything in the root we want to do it in such a way as not to cause any irritation of the parts that lie beyond. What I wish to emphasize is that in all such cases we want to stand upon safe ground and avoid that which is extreme. I may be rather conservative in my views, but I do not think I am any too much so. If I am, experience has made me so.

Dr. Watkins: Dr. Guilford spoke of using a small pellet at the end of a canal before he would insert the filling. I want to ask him why he uses cotton for that purpose, and why he would not use gutta-percha instead of cotton?

Dr. Guilford: I use a fine thread of cotton of such a character that I can pass it up with a fine broach. I am in the habit of touching it slightly with carbolic acid or iodoform paste before introducing.

Dr. Watkins: I would like to ask the doctor how he would treat a tooth where there was an abscess with a fistulous opening in the gum, and if he would not fill the root-canal immediately after he had thoroughly disinfected it with bichloride of mercury and carbolic acid?

Dr. Guilford: I never fill a tooth at once.

Dr. Watkins: I would like to ask Dr. Guilford how he would prepare the buccal canals of the molars for filling, when they are exceedingly fine, without drilling?

Dr. Guilford: I will answer that by asking the gentleman how he would treat them by drilling?

Dr. Watkins: I would use the Morey drill, and get them large enough to fill.

Dr. Rhein: I never practiced immediate root-filling until I used a drill, and I never found a drill that could be used until I got hold of the Morey drill. It is an instrument by means of which you can go

up to the end of any root. They cannot cut through the side of the root, and the danger of breaking is reduced to the minimum; for when this deplorable accident happens the break is generally very close to the shank, so that the portion remaining in the root can be easily grasped and removed.

Dr. McKellops: The subject of root-filling is one that every dentist in the profession is interested in. This drilling of root-canals I am opposed to. I have seen so much mischief done by it. The drills do not follow the canal. It is impossible to tell the shape of a root; it may be flat on one side, and the canal may run very close to that side, and it is often impossible to put a drill into it, and if you do you are pretty certain to have it come out somewhere at the side of the root. All that is necessary is to open just a little of the mouth of the canal, and you can then clean it out and easily fill it with gutta-percha. My friend says he introduces at the apex of the root a little cotton. Did he ever extract a tooth after the root had been filled with cotton? Did he ever smell of one when he was taking it out? I have seen a great deal of destruction from such root-fillings. In filling with gutta-percha, to avoid forcing it through the apex of the root it is only necessary to pay attention to what you are doing. The instant the gutta-percha reaches the apex of the root the patient will feel it, and if you are properly attending to your business you will know it as soon as the patient. I have given this subject as thorough consideration as any man in the profession, and I have tried every conceivable kind of broach and I find there is nothing better than gold and platinum broaches. Herbst, when he was here, introduced the gold broach. I immediately had some of them made, and found I could enter a canal without any fear that the broach was going to break.

Dr. Rhein: Have you ever used the Morey drill?

Dr. McKellops: Yes, I have tried it, and I have seen a great deal of destruction with it. I suppose I have twenty specimens that have been sent to me where the root has been drilled through the side. A lady from Jefferson City went to New York and paid $500 for filling two teeth. One tooth was drilled through about two-thirds up the root; the other was drilled out through the posterior side of it. Both had abscesses, and it being impossible to cure them they were taken out, and I found just exactly where the drill went through. The apex of the root had never been reached at all. As far as my experience goes in the line of immediate filling of roots, I do not believe in that way. Where I have an abscessed tooth, I take time

until I cure it, and then I have no further trouble. It is very well to talk about working without failures. All do not tell us of their failures, and frequently don't know of them for a long time themselves. Patients travel around. They go from one place to another, and so we often are not aware of the final results. You have to watch not only a month or a year, but it may be two years, before some failures will become apparent. So I advocate taking plenty of time for preparing the root and getting it in proper condition, and then I can put my money in my pocket, satisfied that I am right and that I have earned it.

Dr. Watkins: I would like to say for Dr. McKellops's information that the Morey drill will not drill through the side of the root, and I do not think he can make it do so. The point is blunt and does not cut at all. It simply cuts on the side, and he can drill and follow the canal as long as there is a canal to follow.

Dr. McKellops: You will oftentimes find the root of a lateral incisor having a double curve and so thin that you can almost see through it. Tell me how a drill can run in that narrow space which is not thicker than tissue paper?

Dr. Watkins: You can use very small drills and follow such a canal clear through. There is no danger at all, where proper-sized drills are used, of cutting through the side of such a root. I want to say a word in regard to filling root-canals with gutta-percha. If the gutta-percha is made into small cone points, dipped into the oil of cajeput or some essential oil, the surface will be softened sufficiently so that it will slide into the canal beautifully and seal up the foramen and cement itself to the walls of the canal so that you have a perfectly filled canal.

Dr. Southwell: A drill will follow the hole that is ahead of it almost invariably. The Morey drill merely tends to straighten up the line of the crooked canal. It takes off on the full side and cuts very little on the other. When it gets to where the canal is smaller than the non-cutting point of the drill it will not go further, and then a smaller drill is required to continue, using smaller sizes as the canal grows more contracted. It is utterly impossible to cut off on one side. I have drilled through roots myself before I got hold of the Morey drill, which is about as nearly perfect as any drill can be made. The larger Morey drills have non-cutting points, as I understand them, while the smaller sizes will cut at the point.

Dr. Harlan: I shall endeavor to reply to only two or three of my critics. First as to Dr. Rhein. There is no difference between

him and myself except that he is not acquainted with the literature of the subject of disinfection; otherwise he would not have made the criticism upon my paper which he did.

With reference to the drilling of the roots of teeth for their disinfection I will say for his benefit that it is impossible to drill a sufficient amount of dentine from the interior of a root-canal to completely disinfect it without weakening it. With reference to the statement made by Dr. Ottofy about the percentage of roots filled by myself immediately, I will say that a careful reading of the paper will show that it was stated that the roots of teeth might be filled in all cases where the pulp has been destroyed purposely, by the use of arsenic, a cautery, or otherwise; that the roots of teeth might be filled at once where there was a fistulous opening; that the roots of all teeth where the ends were encysted might be filled at once, and that it was not certain but that all roots could be filled at once that were perfectly dry when they were opened into for the first time, but that it was not certain that the roots of teeth could be filled at once where moisture or pus was found on opening into them. That much with reference to that, and I think every intelligent and observant practitioner will testify at once that the classes of cases mentioned will average even more than 60 per cent. that may be filled immediately.

I feel highly complimented by the remarks of Dr. Atkinson. He stated what I had previously stated in my paper,—and he did not give me credit for it,—that it was perfectly safe to fill the root when there was no pericementitis or when the apex of the root was encysted: consequently there can be no difference between us on those points. With reference to the faulty therapy, I will take issue with him now and here on that, but I will not accept his definition of an abscess; though for that matter, he did not fully explain his meaning, as he never does. When he attempts to criticise the efforts of others, he asks you to walk into an unknown realm, but he does not point out the beautiful heaven above. He leads you to believe that HE understands what is there revealed, but that you, with your common apprehension, cannot reach it. That is the style of criticism which does not to us common-place mortals seek the point at issue. He makes statements dogmatically, and then complains of the writer of the report on therapeutics for dogmatically stating that such and such is so. Does he not say dogmatically that coagulators of albumen are indicated? The air is a non-irritant coagulator of albumen, and nature herself is the best healer of flesh-

wounds, in every instance. He states that chloride of zinc, which is a known and powerful irritant, and a poison to protoplasm, is the thing to use. I will say that non-septic air is one of the very best coagulators in the world, and that any flesh-wound will heal when in contact with it, just as well and better than when an irritant, chemical or otherwise, has been applied to it, but it does not so act on the tissue in the pulp-canals—but only to desiccate them, and Dr. Atkinson knows perfectly well that that is so; but coagulators should not be used in root-canals until they are completely disinfected. With reference to one statement made by Dr. Peirce: he stated that if the abscess failed to heal in twenty-four hours after the injection of a medicament through the root, then it would be proper to treat it externally. The healing process will begin in twenty-four hours, but I do not believe that Dr. Peirce thought it would be completed in that short period of time.

SECTION VI.

Physiology and Etiology.

The Deciduous Teeth: Their Eruption and Removal.

Paper by C. N. PEIRCE, of the Section.

THAT the evolution of human dentition has, in common with the dentition of other mammals, been from a simple and homogeneous type to a more complex and heterogeneous one, both as regards structure and form, is established beyond a doubt; and in this modification of tissue from the simple to the complex, and its arrangement, nutrition and the *dietetic* habits have been accepted as important factors.

In considering intelligently the origin and peculiarities of mammalian teeth, and what might constitute a primitive mammalian dentition, it would seem quite necessary to have some definite knowledge of the teeth of the mammalian ancestry, and from these note the gradual change.

If, as has been suggested, we are limited in our choice to the Batrachia and Reptilia as mammalian progenitors, then to these animals must we look for our most primitive tooth-forms. These we find consisting of cone-shaped anchylosed crowns, the number large, uncertain, and frequent, and the succession almost endless.

Accepting the "placoid scale" or the "dermal denticle" as the structure from which all teeth were primarily derived, we have these teeth of the Batrachia and Reptilia as a step in advance, while in certain of the Reptilia a still further progress is made in the implantation of the teeth in distinct sockets, with the addition of a cingulum or an abortive cusp on the crown, and a tendency to bifurcation of the roots by flattening and longitudinal grooving.

From these primitive forms, with numbers and durability so varying, there is much room for modification before we reach the scal-

priform incisors of the Rodentia, the trenchant sectorial tooth of the Carnivora, and the broad grinding molars of the Herbivora, or the less specialized and comparatively-fixed-in-form-and-number teeth of man. The uncertainty in the number and in the succession of the teeth of the Reptilia as compared with the two sets and definite numbers of the higher mammals has led to much conjecture regarding the origin of this definiteness, and to an effort to determine whether the deciduous or the permanent set is entitled to the credit of priority in its evolution; or, in those mammals which have but one set, whether it is the permanent or deciduous which has been lost.

Prof. Owen, in his effort to express concisely the conditions of replacement, made use of the terms "diphyodont" and "monophyodont," and applied them as relative and interchangeable terms with "heterodont" and "homodont," believing that animals having two sets of teeth (diphyodont) had teeth differing in form and complexity in the several localities in the mouth (heterodont), while those having but one set (monophyodont) had teeth of similar form occupying the inferior and superior maxillæ (homodont); but to this rule many exceptions have been found.

Dr. Wortman, in speaking of the relationship of the deciduous to the permanent set, asks: "Are they, the deciduous teeth, superadded embryonic structures similar to the amnion and allantois, which subserve a temporary purpose and disappear with approaching maturity, or are they to be homologized with the first set of teeth of the lower vertebrates?"

The very rudimentary condition of the milk or deciduous teeth in some mammals is evidence of their transitional character; and if it is true that tissues most recently developed are frequently the first to be atrophied, it would seem that these were superadded structures. On the other hand, we must recognize the fact that the enamel-organs of these deciduous teeth arise *de novo* from certain portions of the lining membrane of the oral cavity, and that at a period in their progressive stage of development, by a process of budding, the enamel-organs of their permanent successors arise from the necks of the enamel-organs of the deciduous teeth, just as those of the temporary set do from the epithelial layer of the mouth. Another fact in this connection must also be noted, viz, that the germs of the first permanent molars by their *de novo* origin stand physiologically in the same position as the more anterior deciduous teeth, and that the germs of the second permanent molars arise from

those of the first, and the third from the second, just as do the germs of the permanent anterior teeth from the enamel-organs of their predecessors.

In noting the origin of the first permanent molar, Dr. Wortman says: "There is one thing upon which I would strongly insist, and that is, that the first true molar in the human dentition is a persistent milk molar."

In following the development of the deciduous teeth from the appearance of the epithelial eminence, the epithelial inflection, and the epithelial bands or enamel-organs, we recognize various progressive changes in the germinal tissues between the seventh and the seventeenth week. Modifications are taking place during this period in the embryonic structures for the development of the twenty temporary teeth and, commencing about the fifteenth week, for the development of what is recognized as the first permanent molar. From the seventeenth week these rudimentary structures for the temporary teeth begin to assume on their prospective coronal extremities the shapes of the future crowns; and as the process is completed by the development of ameloblasts for the enamel and osteoblasts or dentinoblasts for the dentine, the solidifying process commences by the deposition of the salts of lime in these previously prepared tissues. This process goes on, probably not without temporary interruption, until the crowns are completed, the incisors at about the fortieth week of fœtal life, or at birth, the molars and cuspids when the infant is not more than six months of age.

At this time the crowns are advancing toward the mucous surface, facilitated by a threefold action, viz, the elongation of the dental pulp, the calcification of its surface to form the dentine of the root, and the adhesion of the dental sac or follicle to its solidified periphery. This last process places the cemental germ or matrix in position and stimulates it into functional activity, for until this period we have only had preparation for the development of two of the hard dental tissues (enamel and dentine); but with the cement matrix in position germinal development is completed, and growth henceforward progresses, modified only by accident or systemic and nutritional conditions.

This gives us, at about the twentieth week of intra-uterine life, the deciduous tooth-germs with their partially-calcified tissues incased in bony crypts, which have been calcifying in the form of septa between the developing germs.

Inclosed first in a sac, the outer layer of which becomes ossified,

the calcified tooth-crown, with its primitive structures and elongating root, is completely surrounded by a bony structure, each tooth in its own individual apartment, and occupying it so fully that room for growth can only be secured by the absorption of the superimposed tissue.

The inferior mandible shows an irregularly calcified groove, ossification of the septa being at this period of embryonic life in a delicate and imperfect condition. The superior jaw has a similar appearance, with septa more decided, though the structure is not so readily displayed. The teeth, removed from their incasements, represent the exact extent of calcification; the incisor crowns having attained about two-thirds of their normal length, while the cuspids and molars have little more than formed their cusps.

The superior centrals, both above and below, have the process absorbed from their labial surfaces, while the palatal and lingual surfaces are still covered by a border of the alveolar process kept prominent by the crypts which contain the germs and partially calcified crowns of the permanent successors.

The absorption of the superimposed tissue from the advancing crown, and the elongation or growth of the root by an increase in the pulpy mass or formative tissue, and its calcification, are the progressive developmental processes which we term "eruption of the teeth." While we shall not now discuss the propriety of the term used to express this physiological action, it is a pertinent inquiry whether "eruption" is an appropriate name for the process under consideration.

The force by which the teeth are propelled toward and through the mucous surface into position is thought by many to be something in addition to that indicated above as the result of normal growth. However this may be, there are occasional aberrant or abnormal results which this theory will not explain, viz, teeth erupted at birth or a few weeks after, which teeth are not further developed than normal, yet the crowns are exposed as fully as if calcification were complete, such teeth being without further attachment with the subjacent tissue than the adaptation of the gum to their necks, while the uncalcified pulp is in juxtaposition with the base of the crown or of the abortive root, as the latter may have been more or less developed.

Such premature eruptions are usually found in children suffering from improper nutrition or other abnormal systemic conditions, and are independent of the force resulting from normal growth. The

question at once arises, whether such premature presentation of the tooth-crown is not wholly due to an absorption or wasting of the superimposed tissue, rather than to the elevation of the crown, which could not well take place without growth of the root, unless it were from the contraction or an expulsive effort of the tooth-follicle.

Charles S. Tomes, in his "Dental Anatomy," p. 191, in speaking of this elevation of the tooth-crown, says: "Very strong objections have been brought forward, clearly proving that this cause (elongation of the root) is quite inadequate to explain all that may be observed. In the first place, teeth with very stunted roots, which may be practically said to have no roots, are often erupted. Again, a tooth may have the whole length of its roots completed, and yet remain buried in the jaw through half of a person's life, and then late in life be erupted. Moreover, when a healthy normal tooth is being erupted, the distance traveled by its crown materially exceeds the amount of addition to the length of its roots which has gone on during the same time."

A further illustration from the same author is given from "Comparative Anatomy:" "The tooth of a crocodile moves upward, tooth-pulp and all, obviously impelled by something different from mere elongation; and my own researches upon the development and succession of reptilian teeth clearly show that a force quite independent of increase in their length shifts the position of, and erupts successive teeth. But what the exact nature of the impulse may be is an unsolved riddle, the explanations which I have read being, to my mind, less satisfying than the admission that we do not know."

In reference to impacted teeth, *i. e.*, teeth whose elevating or eruptive tendencies have been restricted or entirely obstructed from any cause, whether it be unabsorbed bone or indurated gum-tissue: when the root completes its development under such unfavorable conditions, it is usually stunted, or curved (more frequently the latter) in the direction where the surrounding tissue yields most readily. Hence the curvature of the roots is invariably posteriorly, or toward the tuberosity or the ramus, as the tooth may be located in the superior or inferior maxilla.

Teeth in a horizontal position, or inverted, as sometimes occurs, are subject to the same law of progress or projection, that is, in the line of the least resistance. All such teeth, when once fully formed without being erupted, make very slow progress toward the mucous surface except when adjacent or overlying teeth are extracted;

then the necessary absorption of their alveoli exposes to view the previously imbedded teeth. There is a mechanical force, however, acting on all such teeth, tending to bring them to the surface, the same as that which induces the elongation or protrusion from the socket of an unantagonized tooth. The repeated closing of the jaws must exert, to a large extent, this mechanical force, just as the bung in a barrel is elevated by a blow being struck upon the stave on either side of it.

With normally erupted teeth, from six to eight months after birth, the bony crypts, which have scarcely completed the protective cell for the partially calcified tooth-germs and follicle, begin to be absorbed. This process goes on with considerable activity until the labial or outer wall of the alveoli is removed, which takes place in advance of the portion covering the cutting edges. The temporary teeth are not all in the same progressive stage of development; hence we find that while some of the anterior teeth are being freed from their bony incasement the posterior ones are still retained within their crypts, or it may be that some of them are but perfecting their inclosures.

The absorption of the process from the incisor crowns takes place in the average child at seven months of age. The labial surfaces and cutting-edges are free from the bony covering, while the lingual and palatal surfaces are yet protected by the spongy bone which forms part of the crypt of the permanent successor. As soon as these crowns have freed themselves from their bony surroundings and have perforated the superimposed gum, the alveolus rapidly develops around the necks of the teeth and the elongated roots, the depth of the anterior part of the jaw increasing rapidly by this process; and as the molars are erupted, a similar condition in the posterior part of the jaw is concomitant with the elongation and elevation of the rami. Charles S. Tomes says (p. 192, "Dental Anatomy:" "The front teeth are erupted first, and the jaw deepens first in front; later on, the back teeth come up and the jaw is deepened posteriorly; meanwhile, the elongation of the rami has been going on slowly, but without interruption. Thus is brought about a condition of parts allowing of the whole series of teeth coming into their proper mutual antagonism."

It is very evident that the eruption of the teeth is not a continuous process, but that they have periods of growth and of rest, not only of the individual teeth, but of the teeth as a whole, as they are developed in groups or pairs, these periods of rest and growth being

modified or intensified by the conditions controlling the function of nutrition.

While, as a rule, the inferior centrals are erupted first, there are so many cases where the superiors make their prior appearance that the exception must be noted. In the following text and table let it be understood that it is only intended to represent the periods of eruption of the deciduous teeth of the average child, giving a range of two or three months for the several groups or pairs, the writer believing that this will cover the large majority of cases.

The deviations from this "time," as just stated, may be earlier by three or four months, or later by the same period. So constantly is premature development associated with abnormal systemic conditions, that it may be stated, with little danger of contradiction, that where the teeth are in process of eruption from the first to the fourth month the infant is suffering from either deficiency in quantity of blood or deficiency in some important constituents of the blood (anemia). On the other hand, a delay in the eruption from the tenth to the thirteenth month as frequently finds the subject vigorous in body, with the nutritional condition representing all that this implies. The lateral incisors are usually from one to two months later than the centrals, and, reversing the order of the centrials, the superior laterals invariably precede the inferior. The first molars next in order have their cusps uncovered by the absorption of the gum from four to six months subsequent to the appearance of the laterals, there being no regularity in the priority of their eruption in one jaw over the other.

The cuspids, following with about the same intermission, make their appearance between the lateral incisors and first molars; their progress is remarkably slow, and sometimes their eruption is delayed until after the appearance of the second molars. Various reasons have been ascribed for this delay. Trousseau thinks it is due to the greater length of their roots, but the probability is that, coming between teeth already in place, they have a denser and thicker tissue to penetrate. A longer time is required for the removal of this tissue and for the completion of the root, which latter process must be reckoned as one of the factors in bringing the crown into place. The experience of the writer has been that the eruption of these cuspids, when occurring during the months of July August, and September, invariably induces greater systemic disturbance than any of the other groups would under similar circumstances.

The eruption of the second molars usually follows close upon that of the cuspids, probably not more than one or two months intervening. With these the deciduous or temporary dentition is completed, usually during the first two years of life, and sometimes this age is not reached by two months. A delay in the beginning of the eruptive process is not necessarily followed by a corresponding delay in its completion. The writer has been acquainted with three families where no teeth were erupted before the eleventh or twelfth month, and yet the process was completed by the twentieth month and without unusual systemic disturbances.

At the sixteenth week of fœtal life the follicle which incloses within its folds the enamel and dentine organs or germs of the future tooth is closed, and the epithelial band, which has thus far served to hold these germs in connection with the epithelium of the surface, is broken, and the prospective tooth-germs are in what may be called the second stage, or saccular condition. Quickly following this, lime-salts are deposited upon the surfaces of these two organs, and a cap of dentine and a layer of solidified enamel-cells represent the shape and density of these two dental tissues. From the first appearance of these layers of solidified structures a process has begun which, when carried to its normal completion, must result in a dental armature completely occupying the alveolar ridges of a two-year-old child; and from the beginning of this process we shall, for convenience, date the growth of the hard dental tissues, following them in the subjoined table from the commencement of calcification to their completion and arrangement in the dental arches, as follows:

17th week of embryonic life, enamel and dentine of central and lateral incisors begin calcification.

18th week of embryonic life, enamel and dentine of molars and cuspids begin calcification.

20th week, calcification of crypts which incase enamel and dentine germs begins.

40th week, or at birth, calcification of incisor crowns quite complete and roots begin to calcify.

3 months after birth, cuspid and molar crowns complete and roots begin to calcify.

6 to 8 months, central incisors erupted.

7 to 9 months, lateral incisors erupted.

14 to 16 months, first molars erupted.

17 to 18 months, cuspids erupted.

18 to 24 months, second molars erupted. Temporary dentition complete.

While the above table represents the average eruption of the deciduous teeth, there are many exceptions, representing tooth-eruption at earlier and later dates. As above stated, the earlier are usually in infants less vigorous in constitution than normal, waste exceeding supply, while the later periods are most frequently confined to those of good recuperative power and other favorable systemic conditions.

At the time of the eruption of the deciduous or temporary teeth the apical end of the root or roots is not necessarily completed in its calcification, and oftentimes some months elapse after the tooth has taken its place in the arch before the foramen in the end of the root is reduced to its normal size.

The arrangement of the teeth in two parabolic curves, the superior describing a larger segment than the inferior, with the external cusps of the molars and the cutting edges of the superior anterior teeth closing a little external to the inferior, is a normal position seldom deviated from in the deciduous or temporary set. The teeth when first perfected are also equal in height, so that, resting the antagonizing surfaces upon a plane, all would bear equally upon it; they also stand side by side in close juxtaposition, without diastema or spaces between them.

This last is a peculiarity of temporary duration, however, and is not usually observable after the fourth or fifth year. The crypts containing the partially-developed permanent teeth which are to succeed the deciduous ones, behind or posterior to which they lie, are gradually pushing forward and occupying a more anterior position; and in this developing process the temporary teeth may be observed to be slightly separated. They are also, from the same cause, elevated from that uniform height which marks the early normal development.

The roots, which we have seen become perfected and present cone-shaped apical ends with minimum-sized foramina, are of short duration, for scarcely more than a year elapses after their completion before preparation is made for a retrograde metamorphosis, which results in the gradual dissolution of the lime-salts and a return of the organic elements in the root to their embryonal condition.

In the effort to tabulate this interesting and obscure physiological process,—the decalcification or absorption of the roots of the deciduous teeth,—it is difficult to do more than approximate the time at which it takes place. The period at which it begins, as well as the several progressive points indicated by the figures ex-

pressing years of age, though probably not accurate to the month, are yet sufficiently correct to warn the dentist of the need of great care in the application of arsenic for the devitalization of the pulp and in the subsequent treatment of the pulp-chamber and root-canal. This process, beginning first in the roots of the incisors progresses gradually, when it is to be completely and normally accomplished, from near or at the apical end of the root toward the crown, occupying about three years in dissolution; and usually releases the crown of the deciduous incisor between the seventh and eighth years, the absorption of the centrals' roots ordinarily preceding those of the laterals by some months. The absorption of the roots of the first deciduous molars may be placed a year later than those of the lateral incisors, beginning about the middle or close of the sixth year, and terminating with the removal of the first deciduous molars, about the tenth year, the second molars following usually some months or a year later. The cuspids, not infrequently the last of the deciduous teeth to be shed, have their period of absorption extending from the eighth to the twelfth year. While these periods mark the absorption and removal of the teeth in the average mouth, so variable are they in different families that many wide differentiations may be found.

Charles S. Tomes,* in speaking of root-absorption, says: "It was a matter first accurately investigated by my father. The root, at or near to its end, becomes excavated by shallow, cup-shaped depressions; these deepen, coalesce, and thus gradually the whole is eaten away. Although absorption usually commences on that side of the root which is nearest to the successional tooth, it by no means invariably does so; it may be, and often is, attacked on the opposite side, and in many places at once."

"The cementum is usually attacked first, but eventually dentine, and even enamel, comes to be scooped out and removed by an extension of the process. That part of the dentine, however, which immediately surrounds the pulp appears to have more power of resistance than any other part of the tooth, and thus often persists for a time as a sort of hollow column."

That the absorption of the temporary teeth is absolutely independent of pressure is evidently the conviction of Mr. C. S. Tomes; in which the writer fully concurs, though he would take issue with the statement that a successful absorption may begin on other localities than the apical end of the root, and go on to completion.

* Dental Anatomy, p. 195.

The absorptive process, though a physiological one, is certainly somewhat obscure, and in contradistinction to the evolution of the tooth may be termed its dissolution.

The evidence of its being the result of a physiological action is in the fact that it matters not from how many centers it has commenced, it must, to be successful, involve in its early stages the root-canal and pulp therein, the latter maintaining vitality until the completion of the process, as the very moment vitality of the pulp ceases, that instant this retrograde metamorphosis designated "physiological absorption" terminates.

What induces this molecular dissolution it is difficult to state, though the several conditions which are always present and essential are readily recognized, but the part each plays is not easily ascertained. The place of its commencement, at the end of the root, the retention of pulp-vitality, and the presence of a vascular papilla in close proximity to the absorbing surface, with the fact that the surface of this papilla is rich in giant-cells, termed "osteoclasts," are evidently essential accompaniments, and the absence of any one of them would certainly militate against the completion of the process.

The statement that the presence and pressure of the permanent tooth are essential cannot be sustained, as frequently the decalcification of the deciduous tooth is successfully accomplished in the absence of its successor. Again, we often find the permanent tooth impacted against or within the bifurcated roots of the deciduous molar, or pressing down by the side of its single-rooted predecessor, both being more or less displaced by the persistence of the unabsorbed deciduous roots. That the organ has served its purpose, and the nourishment which had previously been appropriated by it is diverted or relegated to its successor, are probably important factors contributing to the success of this interesting physiological process.

This demonstration of dissolution is not alone confined to the roots of the teeth. The rami of the inferior maxillary give evidence of a similar phenomenon by absorption from their anterior borders, with corresponding growth of the interstitial tissue, giving development and prominence to their posterior lines.

There are also bone-cased cavities and canals, increasing in diameter and capacity by absorption from within and addition to the surrounding walls. These, we conclude, are the results of similar physiological efforts.

In considering the absorption of the roots of deciduous teeth, we must not overlook the difference between what has just been designated a physiological process, dependent upon the vitality of the absorbing structures and its contiguous tissues, and the pathological one, which is the result of a suppurative process following the devitalization of some of the same structures. In the former case, as above stated, when successful, the absorption begins at the apical end of the root, and removes the tissue by a gradual encroachment toward the crown, the interior of the root yielding to the solvent most readily, so that there is constantly maintained an inverted cup-shaped cavity into which protrudes the above-described vascular papilla, the active organ in this retrograde metamorphosis. On the other hand, when the pulp is devitalized and an alveolar abscess is established at the apex of the root, a very different condition is presented. Through the influence of the pus in which the root is constantly bathed it presents a peculiar worm-eaten appearance, the shallow grooves oftentimes encircling the root, and presenting several more or less broken, ring-like excavations, varying in depth and wholly unlike in progress and completeness of result that which we have described as being physiological and occurring in the vital root, the devitalized root never in the writer's experience being wholly removed by the pathological process.

We have thus described the influence of what we have been pleased to designate normal and abnormal or physiological and pathological absorption upon the roots of the deciduous teeth.

These same absorptive processes have not been without their influence upon the permanent teeth; but when acting upon these structures much more frequently do they assume an abnormal type. In the large majority of cases disease has been the exciting cause; hence root-disintegration of the permanent tooth would in such cases be pathological. So dissimilar are the two processes, both as regards the progress and the appearance they present, that one would hardly hesitate for a moment in designating that process affecting the devitalized permanent teeth as pathological in contradistinction to the one removing the deciduous teeth, which we have styled physiological.

The exciting causes which stimulate in the vital permanent teeth the abnormality under consideration may be classed as largely mechanical, *i. e.*, injuries, such as partial dislodgment and replacement, malposition of the affected or the adjoining tooth, and a crowded condition of the arch.

It is rarely—indeed, it might be safe to say it is never—possible for a tooth to be dislodged from its socket and replaced, or another tooth inserted in its stead, without there being a persistent effort to reduce to its embryonal condition the bordering-line of one or both tissues which have been disturbed. If this effort is properly sustained by systemic nutritional wealth, the harmonious readjustment of the tissues to each other does not result in much sacrifice of structure; but with feeble recuperative power, deficiency in quality and quantity of pabulum appropriated, and hence in quality and quantity of blood, permanent deficiency of tissue must result. Of all the teeth inserted or reinserted with which the writer has been familiar, a final loss of the tooth by root-absorption could be traced to systemic peculiarities and defective manipulation as important factors inducing the result. That the most exqusite technical skill cannot insure success without regard to temperamental and nutritional qualities goes without saying.

DISCUSSION.

Dr. A. O. Hunt: The writer of the paper seems to be somewhat in doubt as to whether the term eruption is the best that we can have. I think the word "emerge" represents better the gradual physiological process of the development of the teeth. Eruption carries to our minds that there is some violent disturbance, as throwing out, a pathological condition rather than a physiological one.

Dr. Brophy: It seems to me this affords an excellent opportunity for our Section on Nomenclature to exhibit its skill and invent a word to take the place of this word eruption, which I think is an objectionable one, for the reason stated by Dr. Hunt. I do not like his substitute; I think we ought to do better. I presume by next year the Section on Nomenclature will have a word that will fill the place.

Dr. Abbott: I had almost unwittingly written a word here which I think answers the purpose better, provided that my theory of the projection of the tooth into the mouth is correct. Whether it be correct or not it is very difficult to determine, as the writer of the paper says. It is very difficult to say what impels or lifts the tooth into the mouth. I use the word "projection" of the tooth forward into its position, claiming that but for the growth of the root at the end, there would be no movement of the tooth forward. I do not think there would be any change in its position if the stoppage of the growth of the root was brought about at any time. We find

encysted tumors in the mouth caused by teeth the roots of which had stopped their growth prior to attaining the perfect form nature intended.

The process of absorption of the roots of temporary teeth is another vexed question to many; they may have, and I presume do have, very good grounds for the positions they take. It is claimed by Tomes and others that there is some special process, through what he terms osteoclasts, which does the work of eating away and destroying the roots of temporary teeth. This was referred to by the reader of the paper. I do not believe this theory, although I cannot say positively that it is not true. It is further said by Tomes, as you will remember, which position I question, that the absorption of the root of the temporary tooth could not be in consequence of the coming of the permanent one, because it may commence absorbing in another place aside from the one nearest the coming permanent tooth. This may be true, but the cases are exceptional where that occurs. Of course sufficient irritation may be produced around the root of the tooth by some means which may cause absorption upon one side of a root only. This in my judgment is a process which may correctly be termed physiological inflammation, and due as a rule to the near approach of the crown of the permanent tooth to the root of the temporary one.

Dr. Hunt: In the use of the term project, how will you avoid confusion when you use the same term as applied to the position of the teeth in cases of abnormality or irregularity?

Dr. Abbott: That would be a case of protruding, thrown forward, and not projecting straight ahead.

Dr. Hunt: We often use that term in speaking of the relative position of one tooth with another.

Dr. Horton: I have only a few words to say upon this subject of changing the nomenclature. Every one here, from the time he began his studies until now, has used the word erupt as a short way of describing the process of cutting teeth, and understands at once what is meant when the term "eruption of a tooth" is used.

I apprehend the author of the paper has obtained his doubts from some abnormal condition which he has stumbled upon and substituted that for the rule. Doubts frequently come in that way, and yet I hardly feel like charging the gentleman with superficiality in his investigation. These exceptional cases are occasionally found. Within the last year I have seen two or three of them where the temporary teeth were retained and the permanent of course lacking. One pa-

tient, about thirty years old, of good constitution and apparently good health, had the superior temporary cuspids in a good state of preservation, but no signs of incoming permanent teeth or of absorption of the roots of the temporary. Some years ago I knew of a family in which three of the daughters had retained their four superior temporary molars, and at ages ranging from seventeen to twenty-three years there were no signs of the incoming permanent teeth. I am of the opinion expressed by Dr. Abbott that the presence of the germs of the permanent teeth and their growth is always necessary to the absorption of the roots of the temporary teeth, and that this absorption is a vital action. In case the temporary teeth become devitalized, it rarely ever happens that their roots are absorbed, and their retention frequently will cause irregularity in the position of the incoming permanent teeth. In one instance I extracted six roots of the two superior second temporary molars, between which the permanent bicuspids had erupted, in the mouth of a lady twenty-six years old.

But this law of nature which perfects the individual according to the type after its kind must not be thrust aside for any shortcoming or abnormal condition, without more investigation into this subject than has to this time been had. In regard to the retarded eruption of some permanent teeth, I have had very many such cases, and I have invariably found the teeth malplaced or crowded by other teeth. One I remember, a superior cuspid in the mouth of a lady about fifty years old, made its appearance after an upper rubber case had been worn over three years. It lay in the jaw in a horizontal position, of full size and perfect shape and condition, showing that had the germ been in proper position, it would have made its appearance at or near the proper time. That the growth of the root, causing the projection forward and the eruption of the crowns or cusps, is the mode adopted by nature to perfect in its order the masticating apparatus of man, I have no doubt.

Dr. Abbott: The writer of the paper stated that he took exception to the position of Tomes that absorption would take place at the end of the root, and at some other locality possibly. He states that the root commences absorption at the end and progresses toward the crown. This is so if the permanent tooth comes directly under or over, as the case may be, the root of the temporary tooth; but if it comes in contact with the side of the root—as here roughly drawn—the side of the root will be absorbed instead of the end.

Dr. Peirce: I stated that if the absorption commenced on the side it would not go on to completion from that point.

Dr. How: A tooth cannot be properly said to have begun to "erupt" until it shall have appeared. This criticism applies also to the word "project." The tooth could not have been seen to "project" until it had begun to appear; therefore, the new word should include the whole process of growth from the initial stage of development until its conclusion. To meet that difficulty I would suggest the word "advance" as applicable to the process from its beginning to its conclusion.

Dr. Darby: I should not like to say that the child has projected his teeth or has advanced his teeth. The terms do not seem to convey what we want. When you say a child has emerged his teeth or has erupted his teeth we know that means something.

Dr. W. B. Knapp: I think the writer is in error in making the statement that the process of absorption can only be fully consummated when it commences at the apex of the root. There have been many cases observed in which the crown of the permanent tooth approached the deciduous one upon the approximal surface of the root, instead of the apex, and in which the root was so entirely absorbed that there was merely a slight shell left upon the opposite side, and in which the apex had not given away until after the pulp-canal had been passed at a point much nearer the crown.

If the line of the advancing tooth does not touch or approximate the pulp-canal, of course the absorption will not be carried on in that direction. But it makes no difference at what point or from what direction the approach is made; if the pulp-canal and its living contents are in the way, they must and will give place.

Dr. Atkinson: We are here talking about results as causes, talking about consequences as antecedents, talking about concomitants as the immediate inciter of the conditions that we see. Very few teeth begin to dissolve at the end of the root. That the proximity of the permanent teeth is the immediate antecedent of the retrogressive metamorphosis of the membrane is all gratuity. All we know is this, that the retrogression of the connective-tissue is the very first step on all sound roots, and that that never occurs at the apex nor immediately in relation with the pulp structure, but that it is by the melting of the lime-salts and their return to the embryonal condition of what is called the carneous body, which itself is but a converted remnant of the original pulp that was the source of supply of materials that built the teeth in the beginning. These things we

know. As to the length of life of the tissues of the structure, it has been supposed that they run out and were no longer able to maintain themselves with the normal cohesive power to keep them in condition by which the hard structure could be nourished.

That the paper is an admirable one I concede, but that it is overloaded with so many of the side-issues and assumptions of knowledge of effect that are not fruits, I feel is a very great objection to it. The statement that roots of adult teeth deprived of their pulps take a decidedly different method of solution I hold to be untrue. I have extracted teeth, and I have treated teeth and saved them where there was from one-third to two-thirds of the length of the roots between the enamel and cement that had, as far as I was able to descry, passed through exactly the same condition that the deciduous roots do in becoming removed. I have seen beautiful fillings in the roots of incisors and cuspids where the gold remained up to the very foramen, and the entire territory to the portion that was yet undissolved was filled with embryonal structures like a carneous body. Sometimes that goes into a retrogressive condition, producing abscess. The first thing that would attract our attention would be a complaint of uneasiness or the statement that there had been a discharge there for a considerable length of time. Let us here as everywhere else try to discriminate between the limitation of our own apprehension of what we know and what we will be very glad to know, and not assume that we do know that it is important even that we should decide things that do not decide themselves. Let nature express it, and let us earnestly observe, and see if we can induce her to reveal the truth to us.

Dr. Guilford: There are some thoughts suggested by Prof. Peirce's paper that I was hoping to hear brought out and discussed. One is in reference to the original character of the teeth, or rather their original position and typal form. We know that Tomes says the typal form of all teeth is a cone, while Wedl declares it to be a wedge. One writer has asserted that in examining the crown of an incisor tooth by reflected light he has seen outlined in the dentine the three cones of which the crown is made up. Assuming that the cone is the original typal form of the teeth and that both crown and root represent only a combination or aggregation of cones, to which opinion Dr. Peirce inclines, there is still a question of how we are going to account for certain peculiarities that we find.

We have the incisor or cutting tooth, the cuspid or lacerating tooth, and the bicuspids and molars as grinders. Writers on dental

anatomy think that for the sake of harmony, if for nothing else, there should be a gradual blending of one form into that of the adjoining. We have that blending in the case of cuspids, bicuspids, and molars, but it is lacking between the incisors and cuspids. This has led a few writers, the younger Tomes among the number, to assume that in pre-historic man there was a tooth intermediate in form between the lateral and cuspid, and situated between those two teeth. Some incline also to the belief that there originally existed a third bicuspid, or more properly speaking, a tricuspid tooth, situated between the second bicuspid and first molar. Whether or not future discoveries will verify these assumptions, we cannot tell. Dr. Peirce says he believes, and I think Wortman believes, that what we call the first permanent molar is in reality a persistent deciduous molar. One reason for their so believing is that the first permanent molar so strongly resembles in form the second deciduous molar. Above, the deciduous second molar has four cusps and the first permanent molar the same number, while the second permanent molar has (they claim) but three, resembling the third molar. Now, while we think the matter of similarity of form carries with it little weight, we believe them to be wrong in ascribing but three cusps to the second molar. While this tooth is sometimes found with but three cusps, it nearly always has four, although the fourth cusp is usually less pronounced than in the first molar. In the lower jaw there would be more ground for their belief, inasmuch as the second deciduous molar has five cusps, the first permanent molar five and the second permanent molar four, but how, in harmony with their reasoning, will they explain the fact that the lower third molar usually has five cusps? Their second reason for classing the first permanent molar with the deciduous set is the early period of its eruption. It certainly does seem strange and out of what we should suppose to be the proper order, to have a molar erupting as the first one of the permanent set, especially when such is not the case in the deciduous set; but there are better ways in which to account for the strange time of its appearance than by supposing it to be a tardy member of the deciduous set.

Now, while the eruption of this tooth seems not very far distant in point of time from the completion of deciduous dentition, we should bear in mind the fact that the interval between the two is greater than that existing between the eruption of any two successive teeth of the permanent set, if we exclude the third molar, which seems to set aside all law in its erratic eruption. More than this,

the interval between the eruption of the second deciduous molar and the first permanent molar is just about half the length of time that is required for the eruption of all the permanent teeth, the third molars being again excluded. We see no reason for changing our belief as to the sixth-year molar being a member of the permanent set.

Dr. Peirce: Dr. Guilford has made the assertion that I stated that the first permanent molar was a persistent deciduous tooth. I simply quoted Dr. J. L. Wortman on this, but I did say that the resemblance between the development of the first permanent molar and that of the second deciduous molar was very great, and that it led me toward that belief, without asserting that I did believe it, but I am not satisfied in my own mind that such is the case. Dr. Guilford also stated that the first permanent molar invariably has four cusps, and that the second is so like unto it that it cannot be distinguished. This I object to as not a true statement. The second molar is recognized, with very few exceptions, to be a tri-cusp or tri-tubercular molar, and I think if the doctor renews his examination of the teeth he will find that to be the case. Probably the first misunderstanding was due to my not being sufficiently explicit in my conversation with him. What we want is the truth without reference to how it may or may not influence individual practice.

SECTION VII.

Anatomy, Pathology, and Surgery.

Report by TRUMAN W. BROPHY, Chairman of the Section.

MR. PRESIDENT and Gentlemen:—Owing to the discussion during the past six months of the propriety of postponing this meeting until next year, many members lost interest in the programme, and the result has been difficulty in procuring papers, and consequently a detriment to our scientific work. Section VII was reorganized at our last meeting. It includes Anatomy, Pathology, and Surgery, and we urge members of the Association in the future to present their papers to the appropriate Sections. Papers on Pathology and Surgery have been read in other Sections, and the discussions have been, on one paper at least, almost wholly surgical.

A paper on "Sponge-Grafting," by Dr. W. H. Atkinson, will be presented by this Section.

Owing to ill-health I have not prepared a paper such as I had intended, but as a substitute would most respectfully present a subject to you for discussion which, though not quite new, is one of no small interest to the profession. I refer to the operation of implanting teeth; an operation which must either gain favor or be cast aside as unwarranted. While I have little faith in the permanency of the operation, I must admit that I am surprised at the results obtained by those who have practiced it. After having been planted a few weeks, the teeth present a normal color and appearance, as also do the adjacent tissues. Sufficient time has not elapsed, however, since the earlier operations to enable us to determine their permanency and value. In the operation of replanting we not infrequently find within two or three years a very extensive absorption of the tooth-root, and it is not unlikely that implanted teeth may also disorganize in like manner. To drill a hole in the alveolar process and place a tooth therein which has long been extracted, would seem to be a violation of nature's law, which is to

expel non-vital or foreign substances from the tissues; but clinical experience has already established the fact that teeth wholly devoid of vitality (having been extracted many years) may, under favorable circumstances, and by adopting proper antiseptic measures, be implanted, become firm in their artificial alveoli, and promise to remain useful.

The questions to be settled are: When an artificial alveolus is formed, and a tooth planted therein, what change does nature effect to retain the tooth? Does a new peridental membrane develop from the pabulum exudate around the root? If so, does the newly formed membrane become attached to the cementum and thus retain the tooth?

While it is not possible by examination of these cases in the living subject, to procure such evidence as we require to reveal the course pursued by nature, and opportunities for post-mortem examinations are rare, we can and must experiment on the lower animals if we would know the exact physiological changes which follow the operation of which we speak. In the discussion of this subject, I hope that some light may be thrown upon it, and that the experience and observation of gentlemen who have performed these operations may be freely expressed.

SECTION VII.—Continued.

Sponge-Grafting.

Paper by W. H. ATKINSON, of the Section.

THE sponge-graft is primarily adapted to the restoration of tissue traumatically removed, in which there has been no deterioration other than mechanical.

Secondarily, it is the best means of rapid reproduction of lost tissue from the inflammatory process. In this case it will be necessary to enlarge the chasm of the wound sufficiently to go beyond the cirsoid or red line.

Where there is enough living tissue to cover in the cavity without unduly stretching the flaps of tissue, union by first intention may be confidently looked for. Where there is not enough normal flesh to thus cover in the sponge, it will be necessary to make a substitute from sterilized gauze, oiled silk, gold-beater's skin, or other aseptic substance, so as to complete the pocket in which the sponge is placed, to afford the pabulum a nest in which to form the clot out of which protoplasmic embryonal corpuscles and tissues are elaborated to form the bond of union with such tissue as the type of the locality demands.

I have yet to see any case thus treated, where there was no inflammation, that did not heal by first intention without the formation of a single drop of pus.

The constant query of patient and practitioner has been the settlement of the question, "What becomes of the sponge?" one set asserting that it must be absorbed; another that it may be assimilated, becoming part of the embryonal elements from which the new growth arises. Neither of these views has been justified as they may be after we have been able to dissect the cadaver and examine it under the microscope.

Several gentlemen have expressed in my presence an intention of

making practical experimentation of sponge-grafting and replanting of teeth upon animals. When a sufficient number of these cases have been produced we will be better prepared to pronounce correct doctrine upon these intricate questions.

My first case occurred over three years ago, and was not the most favorable to insure success. It resulted from the death of the pulp of an inferior central incisor, the alveolar abscess from which extended so as to involve all the external plate between the cuspids, resulting in a hen's anus fistula that had discharged for years through the thickly-bearded chin. I proceeded to enlarge the fistula with tents of cotton saturated in equal parts of oil of cloves and creasote.

By the third day it was large enough to admit the bone-bur, which was introduced through it, and the carious portions of the external plate were removed from cuspid to cuspid, and the transverse processes between the inferior centrals, both of which, being broken off to the margin of the alveolar plate, were extracted; the transverse process between the left central and the left lateral was then burred out.

The transverse processes were removed through the sockets from which the centrals had been taken, thus affording free access so as to thoroughly remove the carious portions well into the living structure of the bony territory. The débris was washed out with a syringe containing salt and water, the chamber well dried with bibulous paper, and aromatic sulphuric acid was dropped into the chasm or pool until it stood full of this substance, which in a few minutes disappeared, and I supposed was taken up by the surrounding tissues. Styptic cotton was packed in the chasm and a spray of bichloride of mercury solution was thrown on the cotton and surrounding surfaces.

The next day the treatment was repeated. Then simply sterilized dressing was used for three days, when, upon the removal of the dressing, embryonal blood-tracts were shown to have formed on all sides of the chasm. The next day I took a piece of sterilized sponge and cut it into a mass a little larger than the size of the chasm, which was shaped like the letter T, with the cross on the top a third longer from the centre at each end than the upright portion of the T, which was to occupy the portion of the chasm at the site of the old fistula. This piece of sponge was put into a glass and the bichloride of mercury solution poured upon it sufficient to cover it, manipulating the sponge between the thumb and finger, to insure

its complete saturation with the sterilizing fluid. It was then picked out and placed upon a dry napkin and wrung until it would no longer wet the napkin. It was then inserted into the chasm, carefully adjusting it so as to completely fill the place of the lost tissue. The beard was carefully combed over the mouth of the chamber, sprayed, and the patient dismissed.

The next day, upon examination with a pack of bibulous paper in the fingers, slight staining as by serum was shown. Patient was supplied with bibulous paper with which to repeat this process should there be any exudate, requesting him to be particular to apply it often enough to prevent the exudate flowing down into the beard along the chin; sprayed and dismissed. Upon the next visit there was not only evidence of serum when the bibulous pack was pressed on the sponge in the orifice, but the color was deep enough in redness to indicate the presence of fresh blood in the trabeculæ of the sponge.

At the next visit, two days subsequently, handsome granulation tissue of embryonal corpuscles completely filled more than one-half of the area of the exposed portion of the sponge on one side of the cavity where the sponge was tacked fast to the old tissue.

At the next visit there was a slight appearance of pus and serum on the side of the cavity where the graft had not taken. This was seized with a pair of tweezers and pulled upon to ascertain the depth of the pus-pocket. This proved to be shallow, not over one-sixteenth of an inch below the surface of the skin.

When traction was made with some energy the elasticity of the sponge was such as to escape under tension one-sixteenth of an inch beyond the surface of the skin, which did not retract when released from the tweezers, but abundant flow of blood followed to the surface, from which six drops were wiped. The protruding part of the sponge was clipped off. Then the portion which had not taken was seized by artery forceps and put on the stretch, after which all that portion not filled with embryonal tissue was clipped out well into the blood tracts with pointed scissors. The blood was then absorbed, the chasm sterilized, and a supplemental sponge-graft inserted, sprayed, and the patient dismissed, with atomizer and solution of bichloride of mercury, to return in four days.

Upon presentation, granulations filled seven-eighths of the new piece of sponge-graft; patient dismissed as before for three days.

When next seen the supplemental graft proved to have taken well, granulations having been so abundant as to push the external part

of the sponge a line above the surface, which upon being clipped off proved to be full of granulation corpuscles.

Patient dismissed for a week. Upon the next visit a very little pus appeared at a small point next to the old tissue in the side of the new piece of sponge.

This cavity was treated as before and a very minute portion of sponge inserted. About a week afterward there was no sponge to be seen, but a nice brown scab covered the whole surface, which was not removed, but sprayed and patient dismissed to call at his convenience, which he did in about two weeks, when the scab was not to be seen, but a slight cup-like depression at the site of the new growth, and he said: "What has become of the sponge?" This case is now supplied with a tissue indistinguishable from the original structure to any ordinary examination by one not acquainted with the facts in the case.

The case just delineated is happily a compromise between the best and worst cases we meet. All first-class cases heal without any set-back in the shape of tardy closure, pus, sanies, or ichor appearing in the course of the reproduction process. External dressings can be removed, in first-class cases, in from four to eight days, and patient dismissed with assurance that the necessity for further care is ended.

There are, to be sure, conditions to be taken into account, such as sterilization of parts, sterilization of the external dressings (instruments, hands, and napkins), and whatever of gauze, silk, gutta-percha, membrane, Husband's plaster, or other outward protection is needful against the various microbia floating in the air or in the tissues requiring air for their growth and multiplication.

Micologists have grandiloquently assumed that they have found the particular coccus which "*causes*" most of the pathological changes met with in loss of equable nutrition; and have accordingly named these concomitant bodies as the "cause" of the changes observed in the tissues. I regard these classifications as assumptions not yet satisfactorily proved to the earnest and illuminated questioner.

I. Sterilization of the sponge is attained by putting it into water to which one grain of bichloride of mercury to the ounce has been added, and slowly heating it over a bunsen burner or other means of admitting the heat to 130° – 164° F., and no higher, for sufficient reasons, for fifteen minutes.

II. When inserting the sponge wring out all the watery solution,

to be sure none remains to dilute the exudate which forms the clot by penetrating the pores of the sponge and laying the foundation of the new growth.

III. Spray at least three times a day the site under treatment, with either the bichloride solution above named or, which I prefer, a solution of one grain of pottassic-mercuric-iodide to six ounces of water, with an atomizer such as perfumers use.

DISCUSSION.

Dr. Rhein: I adopted sponge-grafting from the outset, and can coincide thoroughly with the views presented in the paper. The paper gives every detail necessary to enable one to practice this method of closing deep wounds, and if the method is carefully followed according to the instructions given, it is sure to result in success. There are one or two points to be taken into consideration. If there is any carious portion of bone left, or anything that is going to occasion further discharge of pus, grafting will prove a failure. So you must be sure that the wound is in a healthy condition when the sponge is grafted. It will reproduce every different type of tissue in which it is placed. I have used it very extensively for alveolar abscesses where there has been a great deal of loss of tissue, and where the hard structure has been reproduced as well as gum-tissue. The solution that is recommended in the paper, the iodide of mercury, is much to be preferred to the bichloride, as it is not open to the objection that has been brought against the latter as to poisoning and salivation. In making a solution of the potassic iodide of mercury, add alcohol ℥i to a ℥xii solution in order to avoid getting a precipitate of the red oxide of mercury.

Dr. Morrison: I presented a paper upon the subject of transplanting and replanting teeth before this Association eleven years ago in Philadelphia, and one of the cases reported at that time I had the pleasure of showing to Dr. Younger when he was in St. Louis last September, and it was very gratifying to him to see the results of an operation of that kind after that length of time. The odontoclasts were at one time at work on the root, but by warning the patient and calling her attention to the proper treatment the trouble was ar rested and the tooth is still in the mouth doing very well. The patient had neglected it, and on the buccal face of it there was a decay probably an eighth of an inch above the gum-line, upon the root. By producing friction daily over the root with the finger and on the the palatal surface, the angry condition of the gum was improved and the use of a soft brush and a little alcohol and prepared chalk as

a dentifrice has had the effect of keeping the tooth in comparatively good condition, although a certain amount of destruction has taken place. I am pleased to see the prominence that Dr. Younger has given the subject of reviving old teeth, and while I have not, as the writer says, the confidence in such an operation that I would have in one in which a fresh tooth was used, yet Dr. Younger's experience intensifies my feelings upon the subject of transplantation and replantation. In the case reported by Dr. McKellops, where a mistake had been made by a dentist and the drill went through the side of the root, replantation is just the operation to perform. Those openings where the drill came through should have been filled with a gold wire and the tooth replanted, and there is no reason why they might not stand for many years and be a creditable monument to the operator.

Dr. Harroun: Previous to the meeting of the Michigan state society a lady called at the dental department of the University for the purpose of having a central tooth put in on a plate. Prof. Dorrance made inquiry as to the whereabouts of the natural tooth. It was produced, having been out of the mouth some three weeks. He informed her the tooth could be replanted, and that it would be much better to have it so than to have a plate, and if she would call when the state meeting occurred, which would be March 23, he would have me give a clinic for that purpose. The above was complied with, and a clinic was given with the following result: Teeth were all loose from pyorrhœa, and stood apart from one-sixteenth to one-eighth of an inch,—not a very favorable case. The tooth had now been out of the mouth about eight weeks, and the socket had filled with a bony deposit. A new socket had to be made for its replantation. The instrument used was a drill constructed after the manner of a gimlet, and a trifle smaller than the root of the tooth. In this case the drill was an admirable one, as the socket was made with one operation and so quickly that little or no pain was experienced. The tooth was slightly roughened at the apex. This roughness was filed off, the root filled, and the filling-material brought out to the pericementum. The tooth was then placed in warm water (120° F.) for twenty minutes, and disinfected with bichloride. All this was done previous to opening the socket. The tooth was now placed in position, and silver wire used as a ligature, which was allowed to remain for three weeks. The tooth was seen fourteen weeks after, and was as firm in place as its mate. Having no delicate instrument with me I could not determine the strength of the peridental attachment.

SECTION I.

Prosthetic Dentistry, Metallurgy, and Chemistry.

Report by C. H. HARROUN, Chairman of the Section.

YOUR chairman of Section I, subjects, Prosthetic Dentistry, Metallurgy, and Chemistry, desires to present a very brief report on these subjects, which cover a wide and extended field in their relation to dentistry, and any one of which would seem to compass ground enough in its practical bearing to our profession to afford a very full report. Yet your committee has found itself not a little embarrassed in its efforts to scan this large field and glean from it enough that is new that has come to our view to make even a small sheaf worthy of being threshed by this body.

Taking these subjects in reverse order, we find but very little new or valuable in the great realm of chemistry, that has been brought out during the past year by the members of our profession or its sister specialties, which fact impresses us that entirely too little time and study are given to this basal study, which underlies the whole structure of medicine in all its specialties. In fact, gentlemen, it would seem that we have but few chemists in our ranks, a lack to be sadly deplored, and a fact which we would commend to the careful consideration of this body.

Metallurgy, since the introduction of vulcanized rubber during the last quarter of a century, has been, step by step, relegated into the background, until now it has almost no footing in practice among us. The easier and cheaper methods of making dentures by the use of rubber have brought upon the profession a retrograde movement that places us to-day in our laboratory work much below the standard of twenty-five years ago, when we did gold and continuous-gum work. So low have we gotten in the scale in this respect that we find but few of the leading men in the profession to-day who

do anything in the laboratory. They all send their work out, especially in our larger cities, to be done by some cheap and indifferent mechanical workman, who, if he had the *skill*, has no *opportunity* to study the needs of the patient in order to *supply* and *restore* the lost parts of the "human face divine," *sacrificed* too often to the Moloch of the forceps, and demanding the best artistic skill of the best minds among us under our own immediate supervision if not our own individual handicraft.

Where to-day are our Corydon Palmers and John Allens of twenty-five years ago? Is not their beautiful art fast becoming "a lost art?" What is the status of our profession to-day in this neglected branch, requiring a knowledge of metallurgy as practiced two and one-half decades ago? Is it not most deplorable? Is it not very questionable whether rubber has not, by supplanting the metals and the study of metallurgy among us, entailed more of evil than of good?

These reflections we would commend to your careful consideration.

In prosthetic dentistry we find coming forward during the last few months indications and results that give more hopeful promise. In gold crown and bridge-work, which has sprung up so suddenly and come, we think, to stay in some form,—when it has passed through the stages of evolution necessary to eliminate from it that which is impracticable, leaving behind the true and useful that is to stand the test of time and experience,—we find much that warrants careful study under the head and belonging to mechanical dentistry, now popularly called "prosthetic dentistry."

While indulging something of a pessimistic view of the horizon presented in our outlook over the field of mechanical dentistry, we recently sighted an old friend in a new dress, from whom formerly we had expected much, but who, like other friends before, had disappointed us. Yet we hailed her quite familiar pale-white face as possibly being the harbinger of a better day, bringing in a better hope of a possible redemption from the slough of despond into which mechanical dentistry has fallen. The name we refer to is Aluminum. We learned from the press that Dr. C. C. Carroll, of Meadville, Pa., one of the older members of this body, had made some valuable discoveries and inventions regarding the uses of aluminum in the mechanic arts, and especially as related to dentistry; that, as the result of long-conducted experiments, he had finally succeeded in casting, welding, and soldering this hitherto intractable material, thus solving the long unsolved problem of prac-

tically working this metal, which possesses such wonderful properties, —such as lightness, strength, conductivity, non-oxidation, and compatibility to the mouth, peculiarly fitting it for a denture if it can be practically worked.

We wrote Dr. Carroll, asking him to attend this meeting and give the result of his experiments in a clinical lecture before us, which he has kindly consented to do, in a full presentation and demonstration of all the steps of his very interesting method of making all forms of dentures by casting aluminum, which promises much; and we bespeak for Dr. Carroll's clinic the closest attention and a thorough analysis and fullest discussion, in the optimistic hope that much good is to come to us through an intelligent acquaintance with this, by Dr. Carroll styled "Queen of Metals," now coming to possess her throne in the realm of metallurgy.

We would not omit to mention a form of metallic lining for vegetable bases as possessing some hygienic advantages in the way of "cleanliness, which, in dentistry, is next to godliness," samples of which linings you no doubt have seen in the S. S. White dental display rooms.

For facilitating the construction of crown and bridge-work the crown die-plate introduced by Dr. Starr, of The S. S. White Dental Mfg. Co., appears to be a useful device and well adapted for the striking up of very perfectly formed cusps on the gold caps of the crowns.

Dr. Woodward's self-packing vulcanizer seems a simple and effective machine for its purpose, and is designed to save the time commonly used in screwing together flasks or presses, and it is claimed does more perfect work than can be done with ordinary vulcanizers.

DISCUSSION.

[Dr. Southwell opened the discussion upon the subject of plate-work, but his remarks were illustrated by diagrams upon the board and were unintelligible to the reporter.]

Dr. Hunt: I think that dentistry to-day has reason to be proud of the exhibition of the methods of casting aluminum presented before this body. The demonstrations here to-day confirm us in the belief that we have scientific men among our number and that this Association is rapidly becoming a scientific body. For a number of years the metallurgists and chemists of the world have been experimenting in the line of soldering aluminum, and now, in the ordinary, every-day work of a dentist its practicability has been

demonstrated. Beyond any question, this is one of the most wonderful discoveries to-day in metallurgy. It will be of great value to the world at large, especially in the mechanic arts. We ought to feel proud of the fact that to a dentist was left the honor of making the discovery. To-day is the first time we have seen aluminum cast and soldered successfully and easily. The manipulation of it requires but little more time and very little more skill than the making of a rubber denture. The expense is also about the same. It seems there is no limit to its application. Its adaptation to the model is very perfect, as is shown by the sharp markings observable on the surface of the cast when it comes out of the flask.

Dr. Horton: Prothesis or prosthesis in surgery means, "The addition of an artificial part to supply a defect of the body." This, so far as the definition informs us, seems only a mechanical appliance, such as a wooden leg, an artificial nose, or a glass eye: hence the word "prosthetic" has been used to qualify or designate such artificial appliances as are used by dentists to supply defects in the oral and dental organism, other than those which can be supplied by what is called operative dentistry. The term appears to convey a wider meaning than the term "mechanical dentistry," which it has so largely supplanted in our vocabulary, and to travel into the domain of the fine arts in supplying other defects than the mere loss of the teeth, so that it comes to pass that we have "prosthetic" dentists and "mechanical" dentists,—the latter to an alarming extent still with us. They may both be combined in the same person, but not by a large majority among those advertising themselves as dentists.

The scope of the prosthetic dentist has reference to restoring defects of the features, caused by the loss of any portion of the maxillæ or any of their appendages, and defects of articulation and of the voice from the same cause. When a case presents itself having any defects from lesions of the oral cavity, the prosthetic dentist takes an impression, makes a cast, and carefully studies any and all defects to be remedied. On the cast he proceeds to make an articulating plate, and on this to build in wax the requisite length of the teeth to be used and a restoration of the features where necessary, trying it from time to time, and adding to or taking from as the case may demand.

He should then select the teeth, having regard to size, shape, color, and position,—which has already been defined,—and then, unless he chooses to do the work himself, all should be placed in the

hands of a competent "mechanical dentist" to reproduce in such materials as the patient may desire. That is my idea of "prosthetic dentistry." I need not mention by name the various materials used to accomplish these results. They are familiar to you all, with perhaps aluminum as the exception, the nature of which is not so generally understood by prosthetic dentists.

With my limited experience and observation, while it may do exceedingly well when produced in its perfection by an expert and enthusiast, like our friend Dr. Carroll, I am apprehensive that a vast majority of dentists will encounter fatal difficulties in finding the metal of sufficient purity to insure perfect results, and in being remunerated for the necessary expense and trouble in producing the case,—there are so many other materials in use of much less expense that seem to answer just as well. This metal possesses many qualities very desirable for a base not found in any other, and I believe will in time and in many cases supply a great need to the dental profession.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time August, 1888.

Resolved, That henceforth no person shall be received as a delegate who is in arrears for dues, or until he has paid to the Treasurer the full amount due at the time his name was dropped for non-payment.

Adopted August, 1874.

Resolved, That hereafter no dental college shall be entitled to representation in this Association that does not require a good English education as a preliminary qualification for its matriculants, to be ascertained by examination.

Adopted August, 1879.

Resolved, That in order to secure representation in this Association, dental colleges must, subsequent to October, 1881, require all students entering therein to take two full courses of lectures previous to coming forward for examination and graduation, and must also state these conditions in their next annual announcement.

Adopted August, 1880.

Resolved, That hereafter no society shall be entitled to representation in this Association that does not require its members to live up to the requirements of our Code of Ethics.

Resolved, When it comes to the knowledge of the Committee on Credentials that any applicant for membership is violating our Code, said applicant shall not be received, and all such applicants shall be referred by the Committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code, except where the violator is a member of this body and has no membership in any local society.

Adopted 1881.

Resolved, That the Secretary be instructed to assign members who may neglect to make their own choice the Section in which they are expected to work.

Adopted 1879.

Resolved, That the reports of Sections shall be called by the President in consecutive order, beginning each succeeding year one number higher than on the preceding year.

1879	commencing	with	No. I.	1887	commencing	with	No. II.
1880	"	"	No. II.	1888	"	"	No. III.
1881	"	"	No. III.	1889	"	"	No. IV.
1882	"	"	No. IV.	1890	"	"	No. V.
1883	"	"	No. V.	1891	"	"	No. VI.
1884	"	"	No. VI.	1892	"	"	No. VII.
1885	"	"	No. VII.	1893	"	"	No. I.
1886	"	"	No. I.	1894	"	"	No. II.

Adopted 1879.

Resolved, That a paper presented to the Committee on Voluntary Essays and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterwards be read before the Association unless it is made the special order by resolution adopted.

Adopted 1885.

It shall be the duty of the Executive Committee of the Association to provide at the opening of each annual meeting a book for the registration of members or visitors as they arrive, which shall also give place of residence and hotel where each may be found.

Adopted 1886.

Resolved, That in the future this Association discountenance the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

Adopted 1886.

Resolved, That it shall be the duty of the chairman of the Credentials Committee to procure and keep a book wherein each delegate who wishes to be considered a permanent member of this Association shall enter his name.

Adopted 1886.